PUBLIC NOTICE

Federal Communications Commission
45 L Street, N.E.
Washington, D.C. 20554

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DA 23-296
April 12, 2023

OFFICE OF INTERNATIONAL AFFAIRS SEEKS COMMENT ON RECOMMENDATIONS APPROVED BY THE WORLD RADIOCOMMUNICATION CONFERENCE ADVISORY COMMITTEE

IB Docket No. 16-185

On April 11, 2023 the World Radiocommunication Conference Advisory Committee (WRC-23 Advisory Committee) approved and provided for Commission consideration of its draft recommendations on issues that will be considered by the 2023 World Radiocommunication Conference (WRC-23).

Based upon an initial review of the draft recommendations forwarded to the Commission, the Office of International Affairs, in coordination with other Commission Bureaus and Offices, tentatively concludes that we can generally support most of the content found in attachment in the WRC-23 Advisory Committee draft recommendation. We seek comment on the draft recommendation provided by the WRC-23 Advisory Committee (Attachment A). In addition, we seek comment on the National Telecommunications and Information Administration (NTIA) draft proposals in Attachment B.

The comments provided by interested parties will assist the FCC in its upcoming consultations with the U.S. Department of State and NTIA in the development of U.S. positions for WRC-23. The proposed recommendations that are attached to this Public Notice may evolve in the course of interagency discussions as we approach WRC-23 and, therefore, do not constitute any final U.S. Government positions on any issue.

The deadline for comments on the proposed recommendations is **April 21, 2023**. It is necessary that all comments be received by **April 21, 2023**, in order to allow sufficient time to finalize the U.S. position before commencement of regional WRC-23 preparatory meetings. All comments are to reference **IB Docket No. 16-185** and to specific recommendations by WAC document number.

Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments on or before **April 21, 2023**. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://apps.fcc.gov/ecfs/.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing.
    - Filings can be sent by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
    - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.U.S.
    - Postal Service first-class, Express, and Priority mail must be addressed to 45 L Street, N.E., Washington DC 20554
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID-19.[1]
- During the time the Commission's building is closed to the general public and until further notice, if more than one docket or rulemaking number appears in the caption of a proceeding, paper filers need not submit two additional copies for each additional docket or rulemaking number; an original and one copy are sufficient.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer and Governmental Affairs Bureau at 202-418-0530 (voice), 1-888-835-5322 (tty).

In addition, one copy of each pleading must be sent to: Dante Ibarra, Designated Federal Official, Global Strategy and Negotiation Division, Office of International Affairs, 45 L Street, N.E., Washington, D.C. 20554; email: WRC-23@fcc.gov.

The complete texts of these recommendations are available by accessing the FCC's WRC-23 web site at: www.fcc.gov/wrc-23. Filings and comments are also available for public inspection and copying during regular business hours at the FCC Reference Information Center, Portals II, 45 L Street, N.E., Washington, D.C. 20554.

For further information, please contact Dante Ibarra at (202) 418-0610 or by email at: WRC-23@fcc.gov.

-FCC–

[1] *See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy*, Public Notice, 35 FCC Rcd 2788 (2020).

ATTACHMENT (A)

WAC-23/071 (04.11.2023)

UNITED STATES OF AMERICA

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

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;*

Aviation VHF radios operating within the frequency band 117.975 - 137 MHz are the primary means to control of aircraft and provide both Air Traffic Control (ATC) and Aeronautical Operational Control (AOC) messages for all manned aircraft globally. All manned aircraft are equipped with a minimum of 1 VHF voice radio, with many aircraft types having multiple radios capable of both voice and data. Due to the systems primary role in air traffic management, it is heavily used in regions with high air traffic such as the United States and Europe.

The use of low-Earth orbiting satellites for VHF aeronautical safety and regularity of flight messages between the pilot and controller have a potential to augment, but not replace, coverage of existing terrestrial VHF communications facilities. Several proposals currently being studied would provide complementary service to oceanic and remote regions that already exists for global navigation satellite systems and satellite based surveillance systems. These implementations would all use existing on-board aircraft VHF radios without any needed modification. However, due to existing VHF frequency congestion, options for new regional or national satellite frequency assignments would be severely limited and require harmonization with existing terrestrial assignments.

In the United States, there is significant utilization by terrestrial VHF systems within the frequency band 117.975 - 137 MHz, which already requires a substantial licensing management process to ensure operations are minimally affected by the frequency congestion. Additionally, the standard voice ATC communications have been recently augmented with a national ATC datalink system which has significantly improved air traffic safety and efficiency. The system, known as the FAA Datacomm Program, utilizes data messages for ATC and AOC functions to aircraft in the air and on the ground, and has been quickly adopted by almost all commercial aircraft operators given the benefits it brings to industry. Similar systems are also being implemented in Europe and Asia.

Current terrestrial voice and datalink networks in the US provide coverage over the entire United States up to at least 40,000 ft altitude, including up to 250+ nautical miles from the national coastline as aircraft transition from oceanic to terrestrial US control. While new VHF SATCOM systems would provide little benefit over the mainland USA, and are likely to be unfeasible in those areas given the extensive frequency congestion, providing extended VHF coverage over oceanic areas would enable significant performance benefits for those aircraft that do not have more advanced communications means such as L-band SATCOM.

In-band coexistence between the AM(R)S and AMS(R)S should be ensured through No. 9.11A coordination through ITU-R and operational frequency planning and coordination in ICAO. The coordination arrangement in the ITU-R Radio Regulations should allow administrations to participate in

planning a new AMS(R)S service without impacting administrations that are not participating or have not yet decided to use a new AMS(R)S service. Selection of an adequate coordination threshold using ICAO planning criteria for aviation systems could permit some areas to develop new AMS(R)S communications services without impacting AM(R)S communications services in other areas. It is important to ensure the entire existing AM(R)S designated operational coverage of over 250 nautical miles is protected from harmful interference, noting that some stations may not be registered in the master international frequency register (MIFR).

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD USA/AI 1.7/1

75.2-137.175 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
117.975-137	AERONAUTICAL MOBILE (R) AERONAUTICAL MOBILE-SATELLITE (R) ADD 5.A17 ADD 5.B17 5.111 5.200 5.201 5.202	

Reasons: Adds an AMS(R)S allocation to the 117.975-137 MHz band.

ADD **USA/AI 1.7/2**

5.A17 In the frequency band 117.975-137 MHz, the use of the aeronautical mobile-satellite (R) service is limited to non-geostationary-satellite systems and is subject to coordination under No. 9.11A. Stations in the aeronautical mobile-satellite (R) service operating in the 117.975-137 MHz frequency band shall not cause harmful interference to, nor claim protection from stations in the aeronautical mobile (R) service. The use of this band by the aeronautical mobile-satellite (R) service shall be limited to systems that operate and are planned in accordance with recognized international aeronautical standards. (WRC-23)

Reasons: To ensure the current and future AM(R)S systems are not constrained.

ADD **USA/AI 1.7/3**

5.B17 In the frequency band 136-137 MHz, space stations operating in the aeronautical mobile-satellite (R) service should ensure that their maximum level of their emissions above 137 MHz does not exceed a pfd of −166.6 dB(W/(m² · 14 kHz)). (WRC-23)

Reasons: To ensure the protection of the incumbent services above 137 MHz.

APPENDIX 5 (REV. WRC-23)

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article 9

ADD USA/AI 1.7/4

Table 5-1 (*continued*) (REV. WRC-23)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/ condition	Calculation method	Remarks
No. 9.14 non-GSO	A non-GSO space station in the AMS(R)S in primary basis with the primary terrestrial AM(R)S stations	117.975 – 137 MHz	-148.0 dBW/(W/(m² · 4 kHz)) to be applied within 470 km of a country's border. This level is for coordination between ICAO systems operating in the aeronautical mobile (R) service and the aeronautical mobile-satellite (R) service.	Power flux density of an AMS(R)S space station on the Earth's surface	to ensure that the entire AM(R)S Designated Operational Coverage (RR No. 45.1.1) is protected.

Reasons: Adding No. 9.14 (a subset of No. 9.11A) coordination threshold to Appendix 5 of Radio Regulations to ensure protections of the AM(R)S Designated Operational Coverage of 250 Nautical miles used by existing terrestrial VHF service providers (which is approximately equivalent to 470 km).

SUP USA/AI 1.7/5

RESOLUTION 428 (WRC-19)

Studies on a possible new allocation to the aeronautical mobile-satellite (R) service within the frequency band 117.975-137 MHz in order to support aeronautical VHF communications in the Earth-to-space and space-to-Earth directions

Reason: Work on agenda item has been completed.

UNITED STATES OF AMERICA
I. PROPOSALS FOR THE WORK OF THE CONFERENCE

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)**.*

BACKGROUND INFORMATION:
Aeronautical mobile (R) service (AM(R)S) frequency bands in the range 2 850 – 22 000 kHz are used for long-distance aeronautical communications in remote and oceanic areas. These aeronautical High Frequency (HF) channels are used for Air Traffic Control (ATC) communications to aircraft for most oceanic areas and are mandated as a minimum equipment needed for an aircraft to enter these areas by many international Civil Aviation USAities.
The last substantive review of Appendix **27** of the ITU Radio Regulations was performed in 1982. Aviation is considering new technologies to significantly improve capacity, connectivity, and quality of service for aviation HF data and voice. This includes a means to digitally combine non-contiguous HF channels together to effectively form a wideband HF system for greater aircraft connectivity and function. However, it is essential any new HF technology does not constrain or interfere with the existing regional aeronautical HF networks.

APPENDIX 27 (REV.WRC-19)*

Frequency allotment Plan for the aeronautical mobile (R) service and related information

PART I – General provisions

Section II – Technical and operational principles used for the establishment of the Plan of allotment of frequencies in the aeronautical mobile (R) service

A – Channel characteristics and utilization

II. 2 FREQUENCIES ALLOTTED

ADD USA/AI 1.9/1

27/18A Individual contiguous or non-contiguous channels complying with the provisions of the present Plan[1] may be aggregated to provide wideband communication.

Reason: Provides a provision in Appendix 27 that allows individual HF channels to be aggregated.

ADD USA/AI 1.9/2

27/18A.1 In particular the provisions related to the protection (Part I, Section II B), to power limits (Nos. **27**/60 and **27**/61), to class of emissions (No. **27**/58), to out-of-band spectrum mask (No. **27**/74), to assigned frequency (No. **27**/75), and to channel spacing (No. **27**/11).

Reason: Ensures the mechanism for the individual HF channels to be aggregated maintains compatibility with the existing aeronautical HF systems.

C – Classes of emission and power

III. 1 CLASSES OF EMISSION

MOD USA/AI 1.9/3

A. 27/57 **1.1 Telephony – amplitude modulation:**

–double sideband A3E*
–single sideband, full carrier H3E*

* A3E and H3E to be used only on 3 023 kHz and 5 680 kHz.

–single sideband, suppressed carrier J3E, J2E, J7E, J9E

Reason: Allows for new signal modulation types.

MOD USA/AI 1.9/4

B. 1.2 Telegraphy ~~(including automatic~~and data transmission~~)~~

Reason: Update title to reflect the use of data.

MOD USA/AI 1.9/5

1. 27/58 **1.2.1 Amplitude modulation:**

– telegraphy without the use of a modulating audio frequency (by on-off keying)	A1A, A1B**
– telegraphy by the on-off keying of an amplitude modulating audio frequency or audio frequencies or by the on-off keying of the modulated emission and including selective calling, single sideband, full carrier	H2B
– multichannel voice frequency telegraphy, single sideband, suppressed carrier	J7~~B~~A
~~other transmissions such as automatic data transmission, single sideband, suppressed carrier~~	~~JXX~~
– telegraphy or data transmissions using any other single sideband, suppressed carrier modulation, under the condition that the reference frequency of the concerned transmission corresponds to the list of carrier (reference) frequencies (No. **27**/18) and its occupied bandwidth does not exceed the upper limit of J3E emissions (No. **27**/12), i.e. 2 800 Hz for each individual channel	J2B, J2D, J7B, J7D, J9B, J9D

Reason: Allows for new signal modulation types while maintaining the necessary conditions to be compatibility with existing aeronautical HF systems.

IV. 2 POWER

MOD USA/AI 1.9/6

27/60 2.1 Unless otherwise specified in Part II of this Appendix, the peak envelope powers supplied to the antenna transmission line shall not exceed the maximum values indicated in the Table below; the corresponding peak effective radiated powers being assumed to be equal to two-thirds of these values.

** A1A, A1B and F1B are permitted provided they do not cause harmful interference to the classes of emission H2B, J3E, J2E, J7E, J9E, J7A~~B~~, J2B, J2D, J7B, J7D, J9B, and J9D ~~and JXX~~. In addition, AlA, A1B and FlB emissions shall be in accordance with the provisions in Nos. **27**/70 to **27**/74 and care should be taken to place these emissions at or near the centre of the channel. However, a modulating audio frequency is permitted with single sideband transmitters, where the carrier is suppressed in accordance with No. **27**/69.

Class of emission	Stations	Maximum peak envelope power
H2B, J3E, J7AB, ~~JXX,~~ A3E*, H3E* (100% modulation)	Aeronautical stations Aircraft stations	6 kW 400 W
J2E, J7E, J9E, J2B, J2D, J7B, J7D, J9B, J9D	Aeronautical stations Aircraft stations	6 kW 400 W
Other emissions such as A1A, A1B, F1B	Aeronautical stations Aircraft stations	1.5 kW 100 W

* A3E and H3E to be used only on 3 023 kHz and 5 680 kHz.

Reason: Updates the new modulation types to the appropriate peak envelope power levels.

SUP USA/AI 1.9/7

RESOLUTION 429 (WRC-19)

Consideration of regulatory provisions for updating Appendix 27 of the Radio Regulations in support of aeronautical HF modernization

Reason: Work on agenda item has been completed.

Modifications to No. 5.394

Some IWG-1 members expressed support to update the international table of frequency allocations with regard to No. **5.394** revising the frequency band 2300-2390 MHz with 2360-2395 MHz as shown in NTIA's March 15, 2023 proposal on Agenda Item 8 to be aligned with the US table of allocations in footnote **US276**. The appropriate regulatory mechanism should be discussed further by NTIA and FCC in reconciliation.

IWG-1 Consideration of Document IWG-1_064_NTIA Letter to FCC_WRC-23 proposals_1.11_7 topic C (03.14.23)

At its 17th meeting on March 22, 2023, IWG-1 considered Document IWG-1/064 with respect to WRC-23 Agenda Item 1.11 Issue A and Issue B. IWG-1 reports that it has no objections to NTIA/RCS proposals for Agenda Item I.11 Issue A and Issue B.

IWG-1 Consideration of Document IWG-1_060 WRC-23 AI 2 (AI 2.1 & 2.10)

At its 17th meeting on March 22, 2023, IWG-1 considered Document IWG-1/060 concerning Agenda Items 2.1 (spectrum allocations to the radiolocation service on a co-primary basis in the frequency band 231.5-275 GHz) and 2.10 (improving the utilization of the VHF maritime frequencies in Appendix **18**) of the Preliminary Agenda for the 2027 World Radiocommunication Conference. IWG-1 reports that it has no views on these agenda items.

WRC-23 Agenda Item 1.1

IWG-2 members were not able to reach consensus on a proposal for WRC-23 agenda item 1.1 and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Boeing and Lockheed Martin.

View B is supported by AT&T, CTIA, GSMA, Nokia, Samsung, T-Mobile, and Verizon.

VIEW A

WRC-23 AGENDA ITEM 1.1

VIEW A

View A supports the NTIA proposal in WAC-23/050 that the U.S. propose to WRC-23 to modify RR No. **5.441B** to specify a more relaxed PFD limit and modify Resolution **223 (Rev.WRC-19)** to remove *resolves* 5 that identifies countries for which the PFD limit in RR No. **5.441B** would not apply. The reason is that a more relaxed PFD limit should be uniformly applied to all administrations. Having a PFD limit applying to the IMT stations of some countries, but not of others, creates an inconsistent regulatory application. Proposing a PFD limit to apply to others to protect services of the United States, while simultaneously indicating that it does not apply to the IMT stations of the United States towards stations of other administrations, would be contradictory. Adding the United States to the IMT identification in RR No. **5.441B** for the band 4800-4990 MHz is out of scope as the agenda item is limited to addressing protection measures for aeronautical and maritime systems. An IMT identification for the band 4800-4990 MHz is also inconsistent with U.S. domestic decisions that have not made the entire band available for an IMT service and therefore does not take into account domestic policy. Importantly, adding the United States' name to *resolves* 5 so as to exempt it from application of the PFD levels would be contrary to the efforts of the United States over the past three years to maintain protection for AMS and MMS in international airspace and waters.

VIEW B

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

[Note: The following revisions are made on top of the RCS Proposal contained in IWG-2_048_RCS_AI1_1_AI1_2.docx.]

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

Mobile broadband plays a crucial and fundamental role in providing access to information for businesses and consumers worldwide. Mobile broadband users are also demanding higher data rates and are increasingly using mobile devices to access audio-visual content. The mobile industry continues to drive technological innovations in order to meet these evolving user demands. In 2020, the first year of the pandemic, the number of Internet users grew by 10.2 per cent, the largest increase in a decade, driven by developing countries where Internet use went up 13.3 per cent. According to ITU estimates, the number of active mobile-cellular telephone subscriptions per 100 inhabitants continues to grow strongly, reaching 110 subscriptions per 100 inhabitants, including a record number of mobile subscriptions with broadband capacity (3G or better).[2] Ninety-five percent of the world's population lives within reach of a mobile broadband service, and the relatively small difference in the number of subscriptions between developed and developing countries demonstrates that connectivity is a priority among people in countries at all levels of development.[3]

The evolution of International Mobile Telecommunications (IMT), which provides wireless telecommunication services on a worldwide scale, has contributed to global economic and social development. IMT systems are now being evolved to provide applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications. The demand for mobile wireless broadband applications such as IMT continues to grow dramatically as does the need for access to radio spectrum to support that growth.[4]

World Radiocommunication Conference 2015 (WRC-15) adopted No. **5.441B** which provides some countries with an identification for International Mobile Telecommunications (IMT) in the frequency band 4 800-4 990 MHz, or portions thereof, under certain conditions including the establishment of a power-flux density (pfd) limit to protect other mobile services. Technical studies to review this limit were conducted during the WRC-19 cycle; however, consensus was not reached. Discussions at WRC-19 resulted in a modification of No. **5.441B** to include additional countries in the footnote, and to further review the pfd limits at WRC-23. Resolution **223** includes ~~was revised to include~~ specific provisions to ensure the protection of current and planned systems of services

[2] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf

[3] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf

[4] Ericsson predicts that total mobile traffic is expected to increase by a factor of five over the next six years, reaching 164 exabytes per month by the end of 2025. Ericsson reports that today, smartphones generate about 95% of total mobile data traffic, and that by 2025, 5G networks will carry about half of the world's mobile data traffic. *See* Ericsson, Mobility Report at 20 (2020), https://www.ericsson.com/49da93/assets/local/mobility-report/documents/2020/june2020-ericsson-mobility-report.pdf. Cisco estimates that, by 2022, 22% of global internet traffic will come from mobile networks, up from 12% in 2017. *See* Cisco Systems Inc., Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022 White Paper (2019), https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html.

allocated to the band, including those relating to aircraft stations, fixed-service stations, and other ground-based stations of the mobile service operating in portions of the 4 800 – 4 990 MHz band through the following *resolves*:

3 that in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. ***9.21*** *by IMT stations in relation to aircraft stations, a coordination distance from an IMT station to the border of another country equal to 300 km (for land path)/450 km (for sea path) applies;*

4 that in the frequency band 4 800-4 990 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. ***9.21*** *by IMT stations in relation to fixed-service stations or other ground-based stations of the mobile service, a coordination distance from an IMT station to the border of another country equal to 70 km applies;*

In addition, WRC-19 decided that the pfd limits, which are subject to review at WRC-23, do not apply in certain countries through the following *resolves*:

5 that the power flux-density (pfd) limits in No. ***5.441B****, which is subject to review at WRC-23, shall not apply to the following countries: Armenia, Brazil, Cambodia, China, Russian Federation, Kazakhstan, Lao P.D.R., Uzbekistan, South Africa, Viet Nam and Zimbabwe.*

Some administrations heavily utilize portions of the 4.8-4.99 GHz frequency band for fixed and mobile (including aeronautical) applications. ~~Many different systems are currently operating in this band, having had to migrate from lower bands in the past. One example is small UAS datalinks that were migrated to this band. In the United States, the 4 940-4 990 MHz band has been the focus of action to expand access, including various opportunities for commercial mobile service operations.~~

V. PROPOSAL:

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD USA/1.1/1

4 800-5 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 800-4 990	FIXED MOBILE 5.440A 5.441A MOD 5.441B 5.442 Radio astronomy 5.149 5.339 5.443	

Reasons: See the modifications for No. **5.441B** below.

MOD USA/1.1/2

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, the United States of America, 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 power flux-density (pfd) produced by this station does not exceed in the band 4 800-4 990 MHz, ~~−155~~134 dB(W/(m^2 · 1 MHz)) produced up to ~~19~~ 30 ~~k~~m above sea level and, in the band 4 800-4 950 MHz, −138 dB(W/(m^2 · 1 MHz)) produced from 30 m up to 19 km above sea level, at ~~20~~ 22 km from the coast, defined as the low-water mark, as officially recognized by the coastal State. ~~This pfd criterion is subject to review at WRC-23.~~ Resolution 223 (Rev.WRC-~~19~~23) applies. ~~This identification shall be effective after WRC-19.~~ (WRC-~~19~~23)

Reasons: The new pfd values in the modified 5.441B at 22 km from the coast are sufficient for the protection of AMS and MMS stations. There are two proposals for pfd in this footnote to accommodate the different receiver characteristics of AMS and MMS as well as the frequency bands these services are allowed to operate in. The new pfd values will raise the operational emissions of an IMT station by 17-21 dB relative to the current level allowing greater flexibility for the IMT operators while still maintaining protection for the AMS/MMS stations. The distance from the coast is changed to 22km to be more closely aligned with the edge of territorial sea as commonly recognized and provides additional propagation loss/higher emission level for an IMT station. ~~Resolution **223** reference is updated to reflect modifications at WRC-23, if any. The "subject to review" and "effective after WRC-19" sentences are obsolete once WRC-23 takes place and can be deleted.~~

MOD USA/1.1/3

VI. RESOLUTION 223 (REV.WRC-~~19~~23)

Additional frequency bands identified for International Mobile Telecommunications

The World Radiocommunication Conference (~~Sharm el Sheikh~~Dubai, ~~UAE~~, 202~~3~~19),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is the ITU vision of global mobile access;

b) that IMT systems provide telecommunication services on a worldwide scale regardless of location, network or terminal used;

c) that IMT provides access to a wide range of telecommunication services supported by fixed telecommunication networks (e.g. public switched telephone network (PSTN)/integrated services digital network (ISDN), high bit rate Internet access), and to other services which are specific to mobile users;

d) that the technical characteristics of IMT are specified in ITU Radiocommunication Sector (ITU-R) and ITU Telecommunication Standardization Sector (ITU-T) Recommendations, including Recommendations ITU-R M.1457 and ITU-R M.2012, which contain the detailed specifications of the terrestrial radio interfaces of IMT;

e) that the evolution of IMT is being studied within ITU-R;

f) that the review of IMT-2000 spectrum requirements at WRC-2000 concentrated on the frequency bands below 3 GHz;

g) that at WARC-92, 230 MHz of spectrum was identified for IMT-2000 in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz, including the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000, in No. **5.388** and under the provisions of Resolution **212 (Rev.WRC-19)**;

h) that since WARC-92 there has been a tremendous growth in mobile communications including an increasing demand for broadband multimedia capability;

i) that the frequency bands identified for IMT are currently used by mobile systems or applications of other radiocommunication services;

j) that Recommendation ITU-R M.1308 addresses the evolution of existing mobile communication systems to IMT-2000, and that Recommendation ITU-R M.1645 addresses the evolution of the IMT systems and maps out their future development;

k) that harmonized worldwide frequency bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

l) that the frequency bands 1 710-1 885 MHz, 2 500-2 690 MHz and 3 300-3 400 MHz are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations;

m) that the frequency band 2 300-2 400 MHz is allocated to the mobile service on a co-primary basis in the three ITU Regions;

n) that the frequency band 2 300-2 400 MHz, or portions thereof, is used extensively in a number of administrations by other services including the aeronautical mobile service (AMS)

for telemetry in accordance with the relevant provisions in the Radio Regulations;

o) that IMT has already been deployed or is being considered for deployment in some countries in the frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500-2 690 MHz and equipment is readily available;

p) that the frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500-2 690 MHz, or parts thereof, are identified for use by administrations wishing to implement IMT;

q) that technological advancement and user needs will promote innovation and accelerate the delivery of advanced communication applications to consumers;

r) that changes in technology may lead to the further development of communication applications, including IMT;

s) that timely availability of spectrum is important to support future applications;

t) that IMT systems are envisaged to provide increased peak data rates and capacity that may require a larger bandwidth;

u) that ITU-R studies forecasted that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;

v) that the frequency band 1 427-1 429 MHz is allocated to the mobile, except aeronautical mobile, service in all three Regions on a primary basis;

w) that the frequency band 1 429-1 525 MHz is allocated to the mobile service in Regions 2 and 3 and to the mobile, except aeronautical mobile, service in Region 1 on a primary basis;

x) that the frequency band 1 518-1 559 MHz is allocated in all three Regions to the mobile- satellite service (MSS) on a primary basis[5];

y) that WRC-15 identified the frequency band 1 427-1 518 MHz for use by administrations wishing to implement terrestrial IMT systems;

z) that there is a need to ensure the continued operations of the MSS in the frequency band 1 518-1 525 MHz;

aa) that appropriate technical measures to facilitate adjacent frequency band compatibility between the MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz need to be studied;

ab) Report ITU-R RA.2332, on compatibility and sharing studies between the radio astronomy service and IMT systems in the frequency bands 608-614 MHz, 1 330-1 400 MHz, 1 400-1 427 MHz, 1 610.6-1 613.8 MHz, 1 660-1 670 MHz, 2 690-2 700 MHz, 4 800-4 990 MHz and 4 990-5 000 MHz;

ac) that WRC-15 and this conference identified the frequency band 3 300-3 400 MHz for use by administrations wishing to implement terrestrial IMT systems in Nos. **5.429B**, **5.429D** and **5.429F**;

ad) that the frequency band 3 300-3 400 MHz is allocated worldwide on a primary basis to the radiolocation service;

ae) that a number of administrations use the frequency band 3 300-3 400 MHz, or portions thereof, which is allocated to the fixed and mobile services on a primary basis in No.

[5] See Table **21-4** for applicable pfd limits.

5.429;

af) that the frequency band 4 800-4 990 MHz is allocated worldwide to the mobile and fixed services on a primary basis;

ag) that WRC-15 and this conference identified the frequency band 4 800-4 990 MHz for use by administrations wishing to implement terrestrial IMT systems in countries listed in Nos. **5.441A** and **5.441B**;

ah) that appropriate technical measures may be considered by administrations at a national level to facilitate adjacent frequency band compatibility between radio astronomy receivers in the frequency band 4 990-5 000 MHz and IMT systems in the frequency band 4 800-4 990 MHz,

emphasizing

a) that flexibility must be afforded to administrations:

- to determine, at a national level, how much spectrum to make available for IMT from within the identified frequency bands;
- to develop their own transition plans, if necessary, tailored to meet their specific deployment of existing systems;
- to have the ability for the identified frequency bands to be used by all services having allocations in those frequency bands;
- to determine the timing of availability and use of the frequency bands identified for IMT, in order to meet particular user demand and other national considerations;

b) that the particular needs of developing countries must be met;

c) that Recommendation ITU-R M.819 describes the objectives to be met by IMT-2000 in order to meet the needs of developing countries,

noting

a) Resolutions **224 (Rev.WRC-19)** and **225 (Rev.WRC-12)**, which also relate to IMT;

b) that the sharing implications between services sharing the frequency bands identified for IMT in No. **5.384A**, as relevant, will need further study in ITU-R;

c) that studies regarding the availability of the frequency band 2 300-2 400 MHz for IMT are being conducted in many countries, the results of which could have implications for the use of those frequency bands in those countries;

d) that, due to differing requirements, not all administrations may need all of the IMT frequency bands identified at WRC-07, or, due to the usage by and investment in existing services, may not be able to implement IMT in all of those frequency bands;

e) that the spectrum for IMT identified by WRC-07 may not completely satisfy the expected requirements of some administrations;

f) that currently operating mobile communication systems may evolve to IMT in their existing frequency bands;

g) that services such as the fixed service, the mobile service (second-generation systems), the space operation service, the space research service and the AMS are in operation or planned in the frequency band 1 710-1 885 MHz, or portions thereof;

h) that in the frequency band 2 300-2 400 MHz, or portions thereof, there are services such as the fixed, mobile, amateur and radiolocation services which are currently in operation

or planned to be in operation in the future;

i) that services such as the broadcasting-satellite service (BSS), the BSS (sound), the MSS (in Region 3) and the fixed service (including multipoint distribution/communication systems) are in operation or planned in the frequency band 2 500-2 690 MHz, or portions thereof;

j) that the identification of several frequency bands for IMT allows administrations to choose the best frequency band or parts thereof for their circumstances;

k) that further study of the technical and operational measures regarding adjacent frequency band compatibility between IMT systems operating below 3 400 MHz and fixed-satellite service earth stations operating above 3 400 MHz may be required;

l) that ITU-R has identified additional work to address further developments in IMT;

m) that the IMT terrestrial radio interfaces as defined in Recommendations ITU-R M.1457 and ITU-R M.2012 are expected to evolve within the framework of ITU-R beyond those initially specified, to provide enhanced services and services beyond those envisaged in the initial implementation;

n) that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band for any application of the services to which it is allocated;

o) that the provisions of Nos. **5.317A**, **5.384A**, **5.388**, **5.429B**, **5.429D**, **5.429F**, **5.441A** and **5.441B** do not prevent administrations from having the choice to implement other technologies in the frequency bands identified for IMT, based on national requirements,

recognizing

that for some administrations the only way of implementing IMT would be spectrum refarming, requiring significant financial investment,

resolves

1 to invite administrations planning to implement IMT to make available, based on user demand and other national considerations, additional frequency bands or portions of the frequency bands above 1 GHz identified in Nos. **5.341B**, **5.384A**, **5.429B**, **5.429D**, **5.429F**, **5.441A** and **5.441B** for the terrestrial component of IMT; due consideration should be given to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the services to which the frequency band is currently allocated;

2 to acknowledge that the differences in the texts of Nos. **5.341B**, **5.384A** and **5.388** do not confer differences in regulatory status;

3 that in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21** by IMT stations in relation to aircraft stations, a coordination distance from an IMT station to the border of another country equal to 300 km (for land path)/450 km (for sea path) applies;

4 that in the frequency band 4 800-4 990 MHz, in order to identify potentially affected administrations when applying the procedure for seeking agreement under No. **9.21** by IMT stations in relation to fixed-service stations or other ground-based stations of the mobile service, a coordination distance from an IMT station to the border of another country equal to 70 km applies;

[Note: The following text (Resolves 5), proposed for deletion in the RCS proposal, has been maintained.]

5 that the power flux-density (pfd) limits in No. **5.441B**, which is subject to review at WRC- 23, shall not apply to the following countries: Armenia, Brazil, Cambodia, China, Russian Federation, Kazakhstan, Lao P.D.R., the United States of America, Uzbekistan, South Africa, Viet Nam and Zimbabwe,

invites the ITU Radiocommunication Sector

1 to conduct compatibility studies in order to provide technical measures to ensure coexistence between the MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz, including guidance on the implementation of frequency arrangements for IMT deployment in the frequency band 1 427-1 518 MHz, taking into account the results of these studies;

~~2 to study the technical and regulatory conditions for the protection of stations of the AMS and the maritime mobile service (MMS) located in international airspace or waters (i.e. outside national territories) and operated in the frequency band 4 800-4 990 MHz;~~

~~3~~2 to continue providing guidance to ensure that IMT can meet the telecommunication needs of developing countries and rural areas;

~~4~~3 to include the results of the studies mentioned in *invites the ITU Radiocommunication Sector* above in one or more ITU-R Recommendations and Reports, as appropriate,

~~*invites the 2023 World Radiocommunication Conference*~~

~~to consider, based on the results of the studies referred to in *invites the ITU Radiocommunication Sector* above, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the AMS and MSS located in international airspace and waters from other stations located within national territories and to review the pfd criteria in No. **5.441B**.~~

Reasons: ~~With the more relaxed pfd values in the modified 5.441B at 22 km from the coast, *resolves* 5 can be deleted to provide a more consistent regulatory condition to all administrations. The other m~~Modifications to the Resolution **223** are consequential after the agenda item 1.1 is satisfied at WRC-23.

_____

WRC-23 Agenda Item 1.2

IWG-2 members were not able to reach consensus on a proposal for WRC-23 agenda item 1.2 with respect to the 10-10.5 GHz band and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by ARRL, Boeing, Lockheed Martin, and Maxar.

View B is supported by AT&T, CTIA, GSMA, Nokia, Samsung, T-Mobile, and Verizon

VIEW A

WRC-23 AGENDA ITEM 1.2 (10-10.5 GHZ)

VIEW A

View A supports the NTIA proposal in WAC-23/050 that the U.S. adopt a proposal for no change to the Table of Frequency Allocations under WRC-23 Agenda Item 1.2 for the 10-10.5 GHz band. The reason is that ITU-R sharing studies show that IMT and radiolocation coexistence is not possible in the same or nearby geographical areas requiring very large separation distances and as such IMT deployments in one country would impact radiolocation in other countries. Additionally, ITU-R sharing studies show large exceedances of the protection criteria towards EESS (active) in the frequency band 10-10.4 GHz and without any mitigation technique to achieve sharing and compatibility. Without a clear and effective mechanism in place to protect radiolocation and EESS (active) of one country from mobile/IMT operations of another, there is no basis for the U.S. to pursue a 10-10.5 GHz regional mobile co-primary allocation or regional IMT identification and should not drive international policy to support mobile/IMT deployments in the band.

VIEW B

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

[Note for WAC: Provided as a revision to the CITEL PCC.II DIAP contained in GT-CMR23-2022-40-037r4.]

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)****;*

BACKGROUND
Source: GT/CMR-23/doc. 029/22 rev.1

Mobile broadband plays a crucial and fundamental role in providing access to information for businesses and consumers worldwide. Mobile broadband users are also demanding higher data rates and are increasingly using mobile devices to access audio-visual content. The mobile industry continues to drive technological innovations in order to meet these evolving user demands.

The evolution of International Mobile Telecommunications (IMT), which provides wireless telecommunication services on a worldwide scale, has contributed to global economic and social development. IMT systems are now being evolved to provide applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications. In November 2015, ITU-R approved Recommendation ITU-R M.2083 "Framework and overall objectives of the future development of IMT for 2020", which highlights three key usage scenarios for IMT-2020: enhanced mobile broadband, massive machine type communications, and ultra-reliable and low latency communications. The success of these usage scenarios, in both developed and developing countries, will rely on both spectrum availability for the terrestrial IMT-2020 systems and the support of high capacity backhaul capabilities (including fiber, wireless, satellite and microwave solutions). Recognizing the need to consider additional mid-band spectrum in the range 3 300 MHz to 10.5 GHz to support the terrestrial component of IMT, WRC-19 approved WRC-23 agenda item 1.2. ITU-R, standards development organizations, and industry continue to progress the work on the development of IMT-2020.

Beyond the results of both WRC-15 and WRC-19, the challenge for the future is now to focus efforts on the frequency range 3 300 MHz to 10.5 GHz. This is a great opportunity to meet the technical and spectral needs for the future development of IMT-2020 systems, better known as 5G.

WRC-23 agenda item 1.2 (Resolution 245 (WRC-19)) calls for 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:

– 3 300-3 400 MHz and 3 600-3 800 MHz and (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).

PROPOSALS
Source: GT/CMR-23/doc. 029/22 rev.1

MOD DIAP/AI1.2(10GHz)/1
Support: [B, DOM, EQA, PRU, URG], USA

10-10.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10-10.4 EARTH EXPLORATION SATELLITE (active) 5.474A 5.474B 5.474C FIXED MOBILE RADIOLOCATION Amateur 5.474D 5.479	**10-10.4** EARTH EXPLORATION SATELLITE (active) 5.474A 5.474B 5.474C RADIOLOCATION MOBILE ADD 5.A12D ADD 5.A12E Amateur 5.474D 5.479 MOD 5.480	**10-10.4** EARTH EXPLORATION SATELLITE (active) 5.474A 5.474B 5.474C FIXED MOBILE RADIOLOCATION Amateur 5.474D 5.479
10.4-10.45 **FIXED** **MOBILE** **RADIOLOCATION** **Amateur**	**10.4-10.45** **RADIOLOCATION** **MOBILE** ADD 5.A12D ADD 5.A12E **Amateur** MOD 5.480	**10.4-10.45** **FIXED** **MOBILE** **RADIOLOCATION** **Amateur**
10.45-10.5 RADIOLOCATION Amateur Amateur-satellite 5.481	**10.45-10.5** RADIOLOCATION MOBILE ADD 5.A12D ADD 5.A12E Amateur Amateur-satellite MOD 5.481	**10.45-10.5** RADIOLOCATION Amateur Amateur-satellite 5.481

Reasons: The identification of sufficient frequency spectrum for IMT is essential to be able to address digitalization (e.g., sustainable smart cities, industries) and reduce the digital divide in the Americas.

[Note for WAC: Comment: Given the Dominican Republic wasn't previously included in 5.480 (no FS allocation), this proposal to add DR in the two sections below should come under AI8 at WRC-23 given WRC-23 1.2 addresses the mobile service.]

MOD DIAP/AI1.2(10GHz)/2
Support: B, [DOM]~~]~~, EQA, PRU, URG, USA

5.480 *Additional allocation:* in Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, [Dominican Republic], El Salvador, Ecuador, Guatemala, Honduras, Mexico, Paraguay, the overseas countries and territories within the Kingdom of the Netherlands in Region 2, Peru, ~~and~~ Uruguay and Venezuela, the frequency band 10-10.45 GHz is also allocated to the fixed ~~and mobile~~ service~~s~~ on a primary basis. ~~In Colombia, Costa Rica, Mexico and Venezuela, the frequency band 10-10.45 GHz is also allocated to the fixed service on a primary basis~~. (WRC-23~~19~~)

Reasons: The identification of sufficient frequency spectrum for IMT is essential to be able to address digitalization (e.g., sustainable smart cities, industries) and reduce the digital divide in the Americas. With the allocation to the mobile service in 10-10.5 GHz in Region 2, this footnote needs to be modified.

MOD DIAP/AI1.2(10GHz)/3
Support: B, [DOM], EQA, PRU, URG, USA

5.481 *Additional allocation:* in Algeria, Germany, Angola, ~~Brazil,~~ China, Côte d'Ivoire, Egypt, ~~El Salvador, Ecuador,~~ Spain, ~~Guatemala,~~ Hungary, Japan, Kenya, Morocco, Nigeria, Oman, Uzbekistan, Pakistan, ~~Paraguay, Peru,~~ the Dem. People's Rep. of Korea, Romania~~,~~ and Tunisia ~~and Uruguay~~, the frequency band 10.45-10.5 GHz is also allocated to the fixed and mobile services on a primary basis. In Brazil, Costa Rica, [Dominican Republic], El Salvador, Ecuador, Guatemala, Paraguay, Peru and Uruguay, the frequency band 10.45-10.5 GHz is also allocated to the fixed service on a primary basis. (WRC-23~~19~~)

Reasons: The identification of sufficient frequency spectrum for IMT is essential to be able to address digitalization (e.g., sustainable smart cities, industries) and reduce the digital divide in the Americas. With the allocation to the mobile service in 10-10.5 GHz in Region 2, this footnote needs to be modified.

ADD DIAP/AI1.2(10GHz)/4
Support: USA

5.A12D In Region 2, stations in the mobile service in the frequency band 10-10.5 GHz shall not cause harmful interference to, or claim protection from, stations operating in the radiolocation service, subject to agreement obtained under No. **9.21**. This does not apply for mobile stations in the band 10-10.5 GHz in Brazil, El Salvador, Ecuador, Guatemala, Paraguay, Peru and Uruguay, and in the frequency band 10-10.45 GHz in Argentina, Chile, Cuba, and Honduras.

Reasons: To provide protection of radiolocation service operations operating in neighbouring administrations in countries that are adding a primary mobile service allocation.

ADD DIAP/AI1.2(10GHz)/5~~4~~
Support: B, DOM, EQA, PRU, URG, USA

5.A12E In Region 2, the frequency band 10-10.5 GHz, is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). ~~The frequency band 10-10.5 GHz is identified for use by administrations in Region 2 wishing to implement the terrestrial component of 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. Resolution **A12E (WRC-23)** applies.

Reasons: The identification of sufficient frequency spectrum for IMT is essential to be able to address digitalization (e.g., sustainable smart cities, industries) and reduce the digital divide in the Americas.

ADD DIAP/AI1.2(10GHz)/65
Support: [B, DOM, EQA, PRU, URG], USA

RESOLUTION A12 10GHZ (WRC-23)

Terrestrial component of International Mobile Telecommunications in the frequency band 10-10.5 GHz

~~Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency band 10.0-10.5 GHz~~

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT), including IMT-2000, IMT-Advanced and IMT-2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that adequate and timely availability of spectrum and supporting regulatory provisions are essential to realize the objectives in Recommendation ITU-R M.2083;

c) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

d) 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,

recognizing

a) that timely availability of wide and contiguous blocks of spectrum is important to support the development of IMT;

b) that the frequency band 10.6-10.68 GHz is allocated on a primary basis to both active and passive services with specific conditions outlined in Resolution **751 (WRC-07)**, based on the conclusion of studies contained in Report ITU-R RS.2096, that allow for sharing with EESS (passive);

c) that the frequency band 10.68-10.7 GHz is globally allocated to passive services and No. **5.340** applies;

resolves

1 that administrations wishing to implement IMT consider use of the band 10 – 10.5 GHz identified for IMT in No.**5A12E** and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the latest relevant ITU-R Recommendations;

2 that administrations shall apply the following conditions for the frequency band 10 – 10.5 GHz:

2.1 take practical measures to ensure the transmitting antennas of outdoor base stations are normally pointing below the horizon, when deploying IMT base stations within the frequency band 10-10.5 GHz; the mechanical pointing needs to be at or below the horizon;
2.2 that, for the purposes of protecting the Earth exploration-satellite service (EESS) (passive), the unwanted emission level per IMT base station shall not exceed -43 dBW in the frequency band 10.6-10.7 GHz;
2.3 that, for the purposes of protecting the Earth exploration-satellite service (EESS) (passive), the unwanted emission level per IMT user equipment shall not exceed -41 dBW in the frequency band 10.6-10.7 GHz;

invites the ITU Radiocommunication Sector

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency bands 10-10.5 GHz;
2 to continue providing guidance to ensure that IMT can meet the telecommunication needs of the developing countries;

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of relevant international organizations.

Reasons: The identification of sufficient frequency spectrum for IMT is essential to be able to address digitalization (e.g., sustainable smart cities, industries) and reduce the digital divide in the Americas.~~Once studies progress in WP5D and the Resolution is developed within CPM Text, a detailed proposal will be submitted.~~Out-of-band emissions are provided based on IMT baseline assumptions using the full array antenna model.

[Note: View B proponents support proposal 7 to only be submitted if USA proposals are reconciled on all frequency bands considered under this agenda item.]

SUP DIAP/AI1.2(10GHz)/67
Support: [B, DOM, EQA, PRU, URG,] USA

RESOLUTION 245 (WRC-19)

Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz

Reasons: Consequential action.

Agenda Item 10 proposal for IMT

IWG-2 members were not able to reach consensus on an Agenda Item 10 proposal for IMT and, therefore, forwards three views on how the FCC should handle this matter.

View A is supported by AT&T, CTIA, Nokia, Qualcomm, T-Mobile, and Verizon.

View B is supported by Amazon, Aviation Spectrum Resources Inc., Boeing, EchoStar, GPSIA, Intelsat, Lockheed Martin, Maxar Technologies Inc, OneWeb, Planet Labs PBC, SES Americom, and SpaceX.

View C is supported by Apple and Samsung.

VIEW A

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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 and Resolution* ***804 (Rev. WRC-19)****;*

BACKGROUND:

The vision for 6G – referred to within the ITU as IMT-2030 – is starting to emerge as foundational technology research for the next generation of wireless innovations has commenced. 6G will take advantage of the combined potential of communications, artificial intelligence (AI), and integrated sensing to further improve system resiliency and enable a more energy-efficient network architecture that generates less harmful gas emissions as well as a device ecosystem with a smaller carbon footprint. There are three main driving forces behind the need for this next generation of wireless technologies: (i) harnessing core technology advancements (in wireless and adjacent areas like semiconductors and materials science); (ii) meeting societal sustainability needs (e.g., economic growth, digital literacy, and green initiatives); and (iii) addressing new requirements for next-level experiences that 5G cannot meet.

6G will comprise of both evolutionary and revolutionary wireless advances and will use a mix of low-, mid- and high-band spectrum. Technologies introduced in 5G Advanced will serve as the evolutionary foundation for 6G fixed and mobile broadband services with much greater capacity and throughput, and lower latency. 6G will provide a major leap in performance and efficiency by enabling more pervasive connectivity, higher reliability and robustness.

Contiguous spectrum bandwidths larger than those currently available in the lower mid-band range (below 7 GHz) are necessary to address traffic growth in mobile networks, meet 6G sensing requirements, and allow for more cost-effective RF circuit design to enable new use cases with greater economic impact. As such, the most suitable frequency bands for the development of new generation radio technologies for 6G are in the 7.125 -15.35 GHz frequency range. This range is a natural extension of the lower mid-band frequency range; the lower part of the range combines the wide-area coverage of sub-6 GHz bands with the extreme capacity of the millimeter wave bands in a cost-effective manner. 6G radio technology in the 7.125 -15.35 GHz frequency range would allow mobile network operators to complement their existing 5G sites, currently operating in the lower mid-band frequency range, and provide wide-area coverage of their networks with a significant increase in capacity.

There is growing momentum around 6G development and policy planning at the international and regional levels. Federal Communications Commission (FCC) Chairwoman Jessica Rosenworcel has acknowledged the importance of wireless policy to our economic and national security interests, and has addressed the need to plan for the next generation in wireless technology in this frequency range, which can support wider coverage and faster speeds.[6] The FCC has open proceedings evaluating the 12.2-12.7

[6] Remarks of Chairwoman Jessica Rosenworcel, "New Frontier of Partnerships", Mobile World Congress, Barcelona, Spain (March 1, 2022).

GHz band as well as the 12.7-13.25 GHz band.[7] Further, initiatives like Next G Alliance, which is comprised of industry, academia, and government, is diligently working on the development of the next generation of wireless technology seeking to advance U.S. leadership and competitiveness in this space. As the responsible group for International Mobile Telecommunications (IMT) matters, ITU-R Working Party 5D commenced work in 2021 to define IMT towards 2030 and beyond by initiating the work on an IMT-2030 Vision. The new ITU-R Recommendation containing detailed standards is expected to be completed by 2030, while the technology proposals are expected to be contributed to the ITU in early 2029. Administrations are invited to support a new WRC-27 agenda item, to be considered under WRC-23 agenda item 10, with the goal of identifying additional frequency bands in the 7.125-15.35 GHz for the terrestrial component of IMT. It is important to recognize that the incumbent services in the range 7.125-15.35 GHz provide important systems for public safety, aviation and other uses, and such operations should be protected. Sharing and compatibility studies are required to ensure the introduction of IMT into any band while protecting those incumbent operations in the same band or adjacent, as appropriate, and not unduly constrained.

The specific proposals for this WRC-27 agenda item are provided below:

PROPOSALS:

ADD USA/10/1

DRAFT NEW RESOLUTION [USA-10-2027] (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 should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;

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

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

recognizing

a) that this conference has identified a number of urgent issues requiring further examination by WRC-27;

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,

[7] *See generally Expanding Flexible Use of the 12.2-12.7 GHz Band*, Notice of Proposed Rulemaking, FCC 21-13, WT Docket No. 20-433 (2021); *Expanding Use of the 12.7-13.23 GHz Band for Mobile Broadband or Other Expanded Use*, Notice of Inquiry, FCC 22-80, GN Docket No. 22-352 (2022).

resolves

to recommend to the Council that a world radiocommunication conference 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 WRC-23 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

…

1.[X] to consider identification of frequency bands within the 7.125 – 15.35 GHz frequency range for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **[AI 10 IMT-2030 SPECTRUM] (WRC-23)**;

…

resolves further

to activate the Conference Preparatory Meeting,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-27,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To provide for studies in the 7.125 – 15.35 GHz frequency range for the purpose of identifying frequency bands for the next generation of mobile technologies – IMT-2030.

ADD USA/10/2

DRAFT NEW RESOLUTION [AI 10 IMT-2030 SPECTRUM] (WRC-23)

Studies on the identification of additional frequency bands for the terrestrial component of IMT between 7.125 and 15.35 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that IMT systems have contributed to global economic and social development in support of a digital economy and society;

c) that IMT systems are now being evolved to provide diverse usage scenarios such as immersive communications, integrated sensing, integrated artificial intelligence and computing;

d) that ultra-low latency, very high bit-rate, and high sensing resolution applications of IMT will require larger contiguous blocks of spectrum (e.g. 500 MHz) for use by administrations wishing to implement IMT currently not available in existing mid-band frequency bands;

e) that frequency bands in the 7.125 – 15.35 GHz frequency range are suitable to meet the 6G requirements for wide-area coverage, high capacity, low latency, and sensing;
f) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;
g) that adequate and timely availability of spectrum and corresponding regulatory provisions are essential to support the future development of IMT-2030;
h) that harmonized worldwide frequency bands and harmonized frequency arrangements for IMT are highly desirable in order to achieve global roaming and the benefits of economies of scale;
i) that a need exists to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service;
j) that the 8 025-8 400 MHz band hosts an EESS allocation globally on a co-primary basis with MetSat, FSS, fixed, and mobile allocations for important public safety as well as scientific Earth imaging;

k) that the frequency band 8 750–8 850 MHz is allocated to the aeronautical radionavigation service, and used extensively for airborne Doppler radar and ground mapping radar to determine ground speed, drift and distance travelled, as well as ground mapping, and must operate with an appropriate level of protection;.
l) that the frequency band 9 000 – 9 200 MHz is allocated to the radiolocation and aeronautical radionavigation services on a primary basis, and used for precision approach radar and airport surveillance detection equipment that must operate with an appropriate level of protection;
m) that the frequency band 9 300 – 9 500 MHz is allocated to the radionavigation service on a primary basis and the aeronautical radionavigation service in **5.475** is used by airborne weather radars that must operate with an appropriate level of protection;
n) the No. 5490 of the Radio Regulations indicates that in the band 12.2-12.7 GHz existing and future terrestrial radiocommunications services shall not cause harmful interference to the space services operating in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix 30;
o) that the frequency band 13.25-13.4 GHz is allocated to the aeronautical radionavigation service for Doppler navigation aids that must operate with an appropriate level of protection,

noting

a) that Resolution ITU-R 65 addresses the principles for the process of development of IMT for 2020 and beyond;
b) that IMT encompasses IMT-2000, IMT-Advanced and IMT-2020 collectively, as described in Resolution ITU-R 56-2 and the ITU is actively studying the development of IMT-2030;
c) that Question ITU-R 77-8/5 considers the needs of developing countries in the development and implementation of IMT;
d) that Question ITU-R 229/5 seeks to address the further development of IMT;
e) that Question ITU-R 262/5 addresses the study of usage of IMT systems for specific applications;
j) that Report ITU-R M.2370 analyses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demand for the period 2020 to 2030;
l) Report ITU-R M.2516, on future technology trends of terrestrial International Mobile Telecommunications systems towards 2030 and beyond,

recognizing

a) that there is a lead time between the allocation of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT;
b) that in order to ensure the future development of IMT it is important to ensure the timely identification of additional spectrum;
c) that any identification of frequency bands for IMT should ensure the protection of incumbent services in the same or adjacent frequency bands, as appropriate, and the evolving needs of these services;
d) that frequency bands in this range allocated to passive services on an exclusive basis are not suitable for an allocation to the mobile service;

resolves to invite the ITU Radiocommunication Sector

1 to study the technical and operational characteristics of the terrestrial component of IMT in the frequency range listed in *resolves to invite the ITU Radiocommunication Sector* 2, taking into account:
- the evolving spectrum needs to meet emerging demand for IMT;
- the evolution of IMT through advances in technology and spectrally efficient techniques;
- the deployment scenarios envisaged for IMT systems and the related requirements of combined wider area coverage, higher capacity and larger bandwidths;
- the needs of developing countries;
- the timeframe in which spectrum would be needed;

2 to conduct the appropriate sharing and compatibility studies[8], with a view to ensuring the protection of services with a primary allocation, without imposing additional regulatory or technical constraints on those services, in the frequency range of 7.125 – 15.35 GHz [9],

resolves

1 to invite the first session of the Conference Preparatory Meeting for WRC-27 to define the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available to ensure that studies referred to in *resolves to invite the ITU Radiocommunication Sector 2* can be completed in time for consideration at WRC-27;

2 to invite WRC-27 to consider, based on the results of the above studies, additional spectrum allocations to the mobile service on a primary basis and to consider identification of frequency bands for the terrestrial component of IMT; the frequency bands to be considered being limited to part or all of the frequency band listed in *resolves to invite the ITU Radiocommunication Sector* 2,

invites administrations

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

Reasons: To provide for studies in the 7.125 – 15.35 GHz frequency range for the purpose of identifying frequency bands for the next generation of mobile technologies – IMT-2030.

[8] Including studies with respect to primary services in the adjacent bands, as appropriate.

[9] Consideration of the 10.68 – 10.7 GHz band is excluded from this range (5.340).

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM FOR [IDENTIFICATION OF FREQUENCY BANDS FOR IMT]

Subject: Proposed future WRC-2027 agenda item to consider identification of the frequency bands within the 7.125 – 15.35 GHz frequency range for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **[AI 10 IMT-2030 SPECTRUM] (WRC-23)**;

Origin: United States of America

Proposal: To conduct studies to identify frequency bands between 7.125 – 15.35 GHz frequency range for use by IMT, seeking regional and global harmonization.

Background/reason*:*
New wireless technologies and applications are driving an increase in demand for access to IMT spectrum. IMT-2030 technology will further increase this demand, particularly for large, contiguous spectrum bandwidths that are necessary to implement new use case scenarios and address traffic growth in mobile networks. To address the needs for envisioned IMT-2030 networks, spectrum in the 7.125 – 15.35 GHz frequency range could facilitate the 2030 capacity-demanding use cases for both wider area coverage and higher capacity.

Radiocommunication services concerned*:* Mobile Service, Fixed Service, Fixed Satellite Service, Mobile Satellite Service, EESS, Radio Astronomy and other services

Indication of possible difficulties*:* The proposed bands are used by other services

Previous/ongoing studies on the issue*:*
Related studies have been already commenced in ITU-R WP 5D.

Studies to be carried out by: ITU-R WP 5D	*with the participation of:* Administrations and Sector members of the ITU-R

ITU-R Study Groups concerned*:* SG4, SG5 and SG7

ITU resource implications, including financial implications (refer to CV126)*:* This proposed agenda item will be studied within the normal ITU-R procedures and planned budget. As the responsible group on IMT studies, ITU-R WP 5D usually conducts meetings three times a year which last at least 6 days each.

Common regional proposal*:* Yes/No	***Multicountry proposal:*** Yes/No *Number of countries:*

Remarks

VIEW B

View B: Create a Preliminary WRC-31 agenda item to address IMT-2030 (See Doc. IWG-2/069 (22.03.2023) for an annotated/redline version of this proposal vs View A)

View B takes the position that an agenda item to look to reallocate spectrum from myriad incumbent services to use for IMT-2030 is not suitable for WRC-27's agenda. There are several reasons for this, not the least of which is the fact, per the View A draft proposal that "[t]he new ITU-R Recommendation containing detailed standards is expected to be completed by 2030, while technology proposals are expected to be contributed to the ITU in early 2029." There will be no reliable characteristics and criteria for IMT-2030 to study ahead of WRC-27 (and perhaps not even ahead of WRC-31). In addition, the proponents of View A have stated that they intend to use this agenda item to gain an understanding of the primary services and applications that are currently using the dozens of allocations worldwide that exist within the very broad intended range of study (7.125-15.35 GHz). The proponents of View A have rejected the calls from incumbent service operators to include IMT-2030 spectrum requirements as a core element of their studies (in defiance of ITU-R/WRC traditions), and have rejected a commitment to ensure the protection of incumbent primary services on a co-frequency/co-coverage basis or to protect their growth and evolution. Finally, the View A proponents have rejected all attempts to understand how the many gigahertz of IMT-available spectrum identified at WRC-19 and previous conferences – much of which is not yet in use in most of the world – is insufficient to meet the still-developing IMT-2030 requirements, or would be revisited if this new, mega-identification exercise were to move forward.

The View B proponents believe that the objectives of the IMT-2030 interests in learning about the use and planned growth of incumbent services in their broad frequency range of choice could (and perhaps should) be achieved solely within the ordinary business of the ITU-R through liaison statements, rather than with a WRC agenda item. The breadth of inquiry raises questions – not addressed at all by View A proponents – of consistency with the language and principles of Resolution **804 (Rev.WRC-19)**.

Nevertheless, the View B proponents recognize the national importance of IMT-2030 development, and offer a compromise approach. Instead of a premature WRC-27 agenda item, the View B proponents propose to convert the View A draft proposal to a preliminary agenda item for WRC-31 in the same tentative frequency range. Studies would be initiated in the ITU-R on both the spectrum requirements for IMT-2030 and the characteristics/parameters, along with gathering the information IMT-2030 proponents seek on incumbent services. Proper recognition of incumbent commercial and civil services is provided, but there are federal services to be added if this moves forward. WRC-27 would, if there is progress, decide on a tailored agenda item for WRC-31 looking to identify additional bands that may be needed for IMT-2030 based on the results of sharing and compatibility studies conducted in the traditional ITU-R manner.

This approach provides both the mechanism for progress on eventual implementation of IMT-2030 in the next decade, and assurance that incumbent service providing numerous critical and commercially vital services would continue to be able to operate and grow.

Finally, the View B proponents strongly oppose the proposal in View C to extend the range of study under View A from 15.3 GHz on the upper end, to 19.7 GHz. That would bring in many additional sharing/compatibility issues, and further threaten the U.S. satellite industry.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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 and Resolution* ***804 (Rev. WRC-19)****;*

BACKGROUND:

The vision for 6G – referred to within the ITU as IMT-2030 – is starting to emerge as foundational technology research for the next generation of wireless innovations has commenced. There are three main driving forces behind the need for this next generation of wireless technologies: (i) harnessing core technology advancements (in wireless and adjacent areas like semiconductors and materials science); (ii) meeting societal sustainability needs (e.g., economic growth, digital literacy, and green initiatives); and (iii) addressing new requirements for next-level experiences that 5G cannot meet. 6G, as currently envisioned in ongoing ITU-R studies, would comprise of both evolutionary and revolutionary wireless advances and will use a mix of low-, mid- and high-band spectrum. Technologies introduced in 5G Advanced will serve as the evolutionary foundation for 6G fixed and mobile broadband services with much greater capacity and throughput, and lower latency. 6G would provide a major leap in performance and efficiency by enabling more pervasive connectivity, higher reliability and robustness.

Contiguous spectrum bandwidths larger than those currently available in the lower mid-band range (below 7 GHz) are currently viewed as necessary to address traffic growth in mobile networks, meet 6G sensing requirements, and allow for more cost-effective RF circuit design to enable new use cases with greater economic impact. As such, the most suitable frequency bands for the development of new generation radio technologies for 6G are in the 7.125 -15.35 GHz frequency range. This range is a natural extension of the lower mid-band frequency range; the lower part of the range combines the wide-area coverage of sub-6 GHz bands with the extreme capacity of the millimeter wave bands in a cost-effective manner. 6G radio technology in the 7.125-15.35 GHz frequency range would allow mobile network operators to complement their existing 5G sites, currently operating in the lower mid-band frequency range, and provide wide-area coverage of their networks with a significant increase in capacity.

There is growing momentum around 6G development and policy planning at the international and regional levels. Federal Communications Commission (FCC) Chairwoman Jessica Rosenworcel has acknowledged the importance of wireless policy to our economic and national security interests, and has addressed the need to plan for the next generation in wireless technology in this frequency range, which can support wider coverage and faster speeds.[10] The FCC has an open proceeding evaluating the 12.2-12.7 GHz band, and has opened a notice of inquiry regarding the 12.7-13.25 GHz band.[11] Further, initiatives like Next G Alliance, which is comprised of industry, academia, and government, is diligently working on the development of the next generation of wireless technology seeking to advance U.S. leadership and competitiveness in this space.

[10] Remarks of Chairwoman Jessica Rosenworcel, "New Frontier of Partnerships", Mobile World Congress, Barcelona, Spain (March 1, 2022).

[11] *See generally Expanding Flexible Use of the 12.2-12.7 GHz Band*, Notice of Proposed Rulemaking, FCC 21-13, WT Docket No. 20-433 (2021); *Expanding Use of the 12.7-13.23 GHz Band for Mobile Broadband or Other Expanded Use*, Notice of Inquiry, FCC 22-80, GN Docket No. 22-352 (2022).

As the responsible group for International Mobile Telecommunications (IMT) matters, ITU-R Working Party 5D commenced work in 2021 to define IMT towards 2030 and beyond by initiating the work on an IMT-2030 Vision. The new ITU-R Recommendation containing detailed standards is expected to be completed by 2030, while the technology proposals are expected to be contributed to the ITU in early 2029.

The frequency bands in the 7.125-15.35 GHz range are and have been heavily used for a plethora of existing services, both active and passive, that will be providing valuable services worldwide well beyond 2030. These services include the earth exploration-satellite service (EESS), the fixed-satellite service (both unplanned GSO and non-GSO, and those subject to Appendix **30B** that are particularly relied upon by developing nations); the broadcasting-satellite service; multiple types of terrestrial and aeronautical radar systems; radiolocation service; space research service; and [add radioastronomy and other federal-side uses here]. Eventual sharing and compatibility studies on the suitability of particular bands in this range for IMT-2030 use will have to ensure the protection of services to which the frequency bands are allocated on a primary basis, without imposing additional regulatory or technical constraints on those services, and also, as appropriate, on services in adjacent bands.

Administrations are invited to support a preliminary agenda item for WRC-31, to be considered under WRC-23 agenda item 10, with the goal of setting forth a path for consideration by WRC-31 of additional frequency bands in the 7.125-15.35 GHz range for the terrestrial component of IMT. It is important to recognize that the incumbent services in the range 7.125-15.35 GHz provide important systems for public safety, aviation and other uses, and such operations should be protected. Sharing and compatibility studies are required to ensure the introduction of IMT into any band while protecting those incumbent operations in the same band or adjacent, as appropriate, and not unduly constrained.

The specific proposals for this WRC-31 preliminary agenda item are provided below:

PROPOSALS:

ADD USA/10/1

DRAFT NEW RESOLUTION [USA-10-2027] (WRC-23)

Preliminary Agenda for the 2031 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 WRC-27 should be established four to six years in advance;

b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences (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,

* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.

resolves to give the view

that the following items should be included in the preliminary agenda for WRC-31:

1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-27;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-27, to consider and take appropriate action in respect of the following items:

…

2.x to consider identification of certain frequency bands within the [7.125 -15.35] GHz frequency range for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **[AI 10 IMT-2030 SPECTRUM] (WRC-23)**;

3 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;

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

5 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;

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

7 to identify those items requiring urgent action by the radiocommunication study groups;

8 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;

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

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

10.1 on the activities of the Radiocommunication Sector since WRC-27;

10.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations[1]; and

[1] This agenda sub-item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations. Administrations are invited to inform the Director of the Radiocommunication Bureau of any difficulties or inconsistencies encountered in the Radio Regulations.

10.3 on action in response to Resolution **80 (Rev.WRC-07)**;

11 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)**,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-31, 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 WRC-31;

2 to submit a draft Report on any difficulties or inconsistencies encountered in the application of the Radio Regulations as referred in agenda item 10.2 to the second session of 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.

Reasons: To provide for the initiation of studies in the 7.125 -15.35 GHz frequency range for the purpose of identifying frequency bands for the next generation of mobile technologies – IMT-2030 – at WRC-31.

ADD USA/10/2

DRAFT NEW RESOLUTION [AI 10 IMT- 2030 SPECTRUM] (WRC-23)

Studies looking to the possible identification by WRC-31 of additional frequency bands for the terrestrial component of IMT-2030 between [7.125 and 15.35 GHz][*]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

b) that IMT systems have contributed to global economic and social development in support of a digital economy and society;

c) that IMT systems are now being evolved to provide diverse usage scenarios such as immersive communications, integrated sensing, integrated artificial intelligence and computing;

[*] The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-27 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate. Only the frequency range in the title is in brackets, but the understanding is that this range throughout this Resolution is in square brackets.

d) that ultra-low latency, very high bit-rate, and high sensing resolution applications of IMT will require larger contiguous blocks of spectrum (e.g. 500 MHz) for use by administrations wishing to implement IMT currently not available in existing mid-band frequency bands;
e) that frequency bands in the 7.125 – 15.35 GHz frequency range are physically suitable to meet the 6G requirements for wide-area coverage, high capacity, low latency, and sensing;
f) that there is longstanding, heavy, and widespread use (including planned future use) of the frequency bands in the 7.125 – 15.35 GHz range in many countries for a variety of primary services including earth exploration-satellite, fixed-satellite (both unplanned and under Appendix **30B**, and both GSO and non-GSO), mobile-satellite, meteorological-satellite, and broadcasting-satellite services; space research service; land, maritime, and aeronautical radiolocation and radionavigation services; fixed and broadcasting services; and radio astronomy service;
g) that the aeronautical radiolocation and radionavigation services and airborne weather radars are safety service systems used by aviation that ensure the safe operation of aircraft and must operate with an appropriate level of protection to comply with the safety and regularity of flight;
h) that adequate and timely availability of spectrum and corresponding regulatory provisions are essential to support the future development of IMT-2030;
i) that a new ITU-R Recommendation containing detailed standards for IMT-2030 is expected to be completed by 2030, while the technology proposals are expected to be contributed to the ITU in early 2029;
j) that harmonized worldwide frequency bands and harmonized frequency arrangements for IMT-2030, where possible, 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 services,

noting

a) that Resolution ITU-R 65 addresses the principles for the process of development of IMT for 2020 and beyond;
b) that IMT encompasses IMT-2000, IMT-Advanced and IMT-2020 collectively, as described in Resolution ITU-R 56-2 and the ITU is actively studying the development of IMT-2030;
c) that Question ITU-R 77-8/5 considers the needs of developing countries in the development and implementation of IMT;
d) that Question ITU-R 229/5 seeks to address the further development of IMT;
e) that Question ITU-R 262/5 addresses the study of usage of IMT systems for specific applications;
f) that Report ITU-R M.2370 analyses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demand for the period 2020 to 2030;
g) Report ITU-R M.2516, on future technology trends of terrestrial International Mobile Telecommunications systems towards 2030 and beyond;
h) that No. **5.490** of the Radio Regulations indicates that in the band 12.2-12.7 GHz, existing and future terrestrial radiocommunication services shall not cause harmful interference to the space services operating in conformity with the BSS Plan for Region 2 contained in Appendix **30**,

recognizing

a) that there is a lead time between the allocation of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT-2030;
b) that WRC-19 allocated or identified several gigahertz of spectrum for IMT use around the world, and that very few administrations have implemented or begun using the spectrum made available at WRC-19;
c) that, taking into due account *recognizings a)* and *b)* above, in order to ensure the future development of IMT-2030 it is important to ensure the timely identification of additional spectrum;

d) that the 8 025-8 400 MHz band hosts an EESS allocation globally on a co-primary basis with MetSat, FSS, fixed, and mobile allocations for important defense and intelligence as well as scientific Earth imaging and new in-space servicing, assembly, and manufacturing applications;

e) that the frequency band 8 500-10 500 MHz is allocated globally on a primary basis to the Radiolocation service and used for scanning, tracking, search and rescue, imaging, and surveillance;

f) that the frequency band 8 750–8 850 MHz is allocated to the aeronautical radionavigation service, and used extensively for airborne Doppler radar and ground mapping radar to determine ground speed, drift and distance travelled, as well as ground mapping, and because this is an aviation safety service, such use must operate with an appropriate level of protection to comply with the safety and regularity of flight.

g) that the frequency band 9 000 – 9 200 MHz is allocated to the radiolocation and aeronautical radionavigation services on a primary basis, and used for precision approach radar and airport surveillance detection equipment, and because the aeronautical radionavigation service is a safety service, it must operate with an appropriate level of protection to comply with the safety and regularity of flight;

h) that the frequency band 9 300 – 9 500 MHz is allocated to the radionavigation service on a primary basis and the aeronautical radionavigation service; and is used by airborne weather radars, and because this is an aviation safety service, such use must operate with an appropriate level of protection to comply with the safety and regularity of flight;

i) that the fixed-satellite service primary allocations in the 10, 11/12, and 14 GHz bands are heavily used around the world for ubiquitously-deployed very small aperture terminals;

j) that the frequency band 12.2-12.7 GHz is the Appendix **30** planned BSS downlink band that is used in Region 2 to provide direct-to-home video services to millions of consumers;

k) that the frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the fixed, fixed-satellite (FSS) (Earth-to-space) and mobile services, and on a secondary basis to the space research (deep space) (space-to-Earth) service globally;

l) that the frequency band 12.75-13.25 GHz is used by the geostationary-satellite (GSO) FSS in accordance with the provisions of Appendix **30B** (No. **5.441**) and there are many existing GSO FSS satellite networks operating in this frequency band;

m) that the frequency band 13.25-13.4 GHz is allocated to the aeronautical radionavigation service for Doppler navigation aids, and such use requires protections as a potentially impacted adjacent frequency band used for public and aviation safety;

n) that, given the importance and breadth of use of spectrum in the 7.125-15.35 GHz range and adjacent bands by many different services worldwide as noted in *considerings f)* and *g)* above, any identification of frequency bands for IMT-2030 or other IMT use on a co-frequency or adjacent-band basis in the same geographical area needs to await the results of detailed sharing and compatibility studies that ensure the protection of the existing services and the absence of additional technical or regulatory constraints on those services, and the evolving needs and growth of these services;

o) that any identification of frequency bands for IMT-2030 in bands adjacent to the bands in *recognizings e), f),g) and m)* should consider in-band protection and adjacent band compatibility of services to ensure the safety and regularity of flight;

p) that frequency bands in this range allocated to passive services on an exclusive basis and the aeronautical radionavigation service are not suitable for an allocation to the mobile service;

q) that Resolution **804 (Rev.WRC-19)** includes as a principle for establishing WRC agendas a condition that "resources associated with the subject are kept within a range which is manageable for Member States and Sector Members, BR and ITU-R study groups and CPM,"

resolves to invite the ITU Radiocommunication Sector

1 to study and develop, in time for consideration in studies under *resolves to invite the ITU Radiocommunication Sector 2* for WRC-31, the technical and operational characteristics of the terrestrial component of IMT-2030 in the frequency range listed in *resolves to invite the ITU Radiocommunication Sector* 2, taking into account:

- the evolving spectrum needs to meet emerging demand for IMT-2030;

- the evolution of IMT-2030 through advances in technology and spectrally efficient techniques;
- the deployment scenarios envisaged for IMT-2030 systems and the related spectrum requirements and requirements of combined wider area coverage, higher capacity and larger bandwidths;
- the needs of developing countries;
- whether, and if so to what extent, spectrum needs identified in these studies can be achieved using spectrum identified for IMT use at WRC-19 and earlier WRCs; if not, whether spectrum previously identified for IMT use can be made available for reallocation or redesignation for other uses;
- the technical and operational characteristics of, as well as the protection criteria for, services already allocated on a primary basis in the bands under study;
- the timeframe in which spectrum would be needed;

2 to conduct and complete in time for WRC-31, taking into due account the results of studies under *resolves to invite the ITU Radiocommunication Sector* 1 above, the appropriate sharing and compatibility studies[12] to ensure the protection of services to which the frequency bands are allocated on a primary basis, without imposing additional regulatory or technical constraints on those services, for the frequency bands in the range of 7.125 - 15.35 GHz [13],

invites the 2031 World Radiocommunication Conference

to consider, based solely on the results of the above studies, possible allocations to the mobile service on a primary basis and to consider identification of frequency bands for the terrestrial component of IMT-2030, the frequency bands to be considered being limited to part or all of the frequency band listed in *resolves to invite the ITU Radiocommunication Sector* 2,

invites administrations

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

Reasons: To provide for studies in the 7.125-15.35 GHz frequency range for the purpose of identifying frequency bands for the next generation of mobile technologies – IMT-2030 – at WRC-31.

[12] Including studies with respect to primary services in the adjacent bands, as appropriate.

[13] The following frequency bands are excluded from this range: 8.750-8.850 GHz and 9.0-9.2 GHz allocated to Aeronautical Radionavigation, 9.3-9.5 GHz allocated to Radionavigation, and per No. 5.340 the band 10.68 – 10.7 GHz.

ATTACHMENT

PROPOSAL FOR PRELIMINARY WRC-31 AGENDA ITEM FOR STUDIES LOOKING TO THE POSSIBLE IDENTIFICATION BY WRC-31 OF ADDITIONAL FREQUENCY BANDS FOR THE TERRESTRIAL COMPONENT OF IMT-2030 BETWEEN 7.125 AND 15.35 GHZ

Subject: Proposed preliminary WRC-31 agenda item to consider possible identification of the frequency bands within the 7.125-15.35 GHz frequency range for International Mobile Telecommunications (IMT-2030), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **[AI 10 IMT-2030 SPECTRUM] (WRC-23)**;

Origin: United States of America

Proposal: To conduct studies to identify frequency bands between 7.125-15.35 GHz frequency range for use by IMT, seeking regional and global harmonization.

***Background/reason**:*
New wireless technologies and applications are driving an increase in demand for access to IMT spectrum. IMT-2030 technology is being developed to further increase this demand, particularly for large, contiguous spectrum bandwidths that are necessary to implement new use case scenarios and address traffic growth in mobile networks. To address the needs for envisioned IMT-2030 networks, spectrum in the 7.125-15.35 GHz frequency range could facilitate the 2030 capacity-demanding use cases for both wider area coverage and higher capacity.

***Radiocommunication services concerned**:* Mobile Service, Fixed Service, Fixed Satellite Service, Mobile Satellite Service, EESS, Radio Astronomy and other services

***Indication of possible difficulties**:* The proposed bands are used by other services

***Previous/ongoing studies on the issue**:*
Related studies have been already commenced in ITU-R WP 5D.

Studies to be carried out by: ITU-R WP 5D/Possible JTG (after IMT-2030 characteristics are developed within WP 5D)	*with the participation of:* Study Groups and working parties addressing services with primary allocations in the frequency range under consideration, Administrations and Sector members of the ITU-R

***ITU-R Study Groups concerned**:* SG4, SG5, SG6, and SG7

***ITU resource implications, including financial implications (refer to CV126)**:* This proposed agenda item may be able to be studied within the normal ITU-R procedures and planned budget, depending on the extent of the frequency bands within the range that are ultimately considered for IMT-2030 use. As the responsible group on IMT-2030 studies, ITU-R WP 5D usually conducts meetings three times a year which last at least 6 days each.

Common regional proposal**:* Yes/No ***Multicountry proposal: Yes/No
Number of countries:

Remarks

VIEW C

View C: Create a WRC-27 agenda item to address spectrum for IMT

Given that some IWG-2 offline participants raised concerns with the wide frequency band included in the View A proposal for a future IMT agenda item, View C proposes to narrow that range significantly. In addition, the US should be prepared to propose that the scope of any agreed studies include bands adjacent to the primary frequencies of interest and that a Joint Task Group be established to conduct the studies since incumbent services within several Study Groups will need to be represented.

As a result of discussion within IWG-2, the supporters of View C can further limit the range shown in the View C proposal to the bands 10.7-15.35 GHz and 18.1-19.7 GHz.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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 and Resolution* ***804 (Rev. WRC-19)****;*

BACKGROUND:

The vision for 6G – referred to within the ITU as IMT-2030 – is starting to emerge as foundational technology research for the next generation of wireless innovations has commenced. 6G will take advantage of the combined potential of communications, artificial intelligence (AI), and integrated sensing to further improve system resiliency and enable a more energy-efficient network architecture that generates less harmful gas emissions as well as a device ecosystem with a smaller carbon footprint. There are three main driving forces behind the need for this next generation of wireless technologies: (i) harnessing core technology advancements (in wireless and adjacent areas like semiconductors and materials science); (ii) meeting societal sustainability needs (e.g., economic growth, digital literacy, and green initiatives); and (iii) addressing new requirements for next-level experiences that 5G cannot meet.

6G will comprise of both evolutionary and revolutionary wireless advances and will use a mix of low-, mid- and high-band spectrum. Technologies introduced in 5G Advanced will serve as the evolutionary foundation for 6G fixed and mobile broadband services with much greater capacity and throughput, and lower latency. 6G will provide a major leap in performance and efficiency by enabling more pervasive connectivity, higher reliability and robustness.

Ultra Wide Band (UWB) has been deployed in various industrial applications for RTLS (Real-Time Location System) and asset tracking in years past based on early standards and technology. Based on evolution of these technologies and standards, products and services enabling digital keys for entry and access to vehicles, homes and buildings have been brought to market. Furthermore services enabling mobile payment and public transport are in active preparation with a wealth of additional services being identified and prepared in domains such as as smart cities and mobility, smart buildings and industrial, smart retail and smart homes

Due to the existing regulation, UWB can only have very small transmission power and hence the UWB products use 7.7-9.3 GHz where there currently is no significant interference from other systems. If 7.7-9.3 GHz is included in the IMT spectrum, the strong transmission power of the IMT system using the same frequency band would cause significant interference to the UWB devices and cause unrecoverable damages to the existing customers of UWB services.

Contiguous spectrum bandwidths larger than those currently available in the lower mid-band range (below 7 GHz) are necessary to address traffic growth in mobile networks, meet 6G sensing requirements, and allow for more cost-effective RF circuit design to enable new use cases with greater economic impact. As such, the most suitable frequency bands for the development of new generation radio technologies for 6G are in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range. This range is a natural extension of the lower mid-band frequency range; the lower part of the range combines the wide-area coverage of sub-6 GHz bands with the extreme capacity of the millimeter wave bands in a cost-effective manner. 6G radio technology in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range would allow mobile network operators to complement their existing 5G sites, currently operating in the lower mid-band frequency range, and provide wide-area coverage of their networks with a significant increase in capacity.

There is growing momentum around 6G development and policy planning at the international and

regional levels. Federal Communications Commission (FCC) Chairwoman Jessica Rosenworcel has acknowledged the importance of wireless policy to our economic and national security interests, and has addressed the need to plan for the next generation in wireless technology in this frequency range, which can support wider coverage and faster speeds.[14] The FCC has open proceedings evaluating the 12.2-12.7 GHz band as well as the 12.7-13.25 GHz band.[15] Further, initiatives like Next G Alliance, which is comprised of industry, academia, and government, is diligently working on the development of the next generation of wireless technology seeking to advance U.S. leadership and competitiveness in this space. As the responsible group for International Mobile Telecommunications (IMT) matters, ITU-R Working Party 5D commenced work in 2021 to define IMT towards 2030 and beyond by initiating the work on an IMT-2030 Vision. The new ITU-R Recommendation containing detailed standards is expected to be completed by 2030, while the technology proposals are expected to be contributed to the ITU in early 2029.

Administrations are invited to support a new WRC-27 agenda item, to be considered under WRC-23 agenda item 10, with the goal of identifying additional frequency bands in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz for the terrestrial component of IMT. It is important to recognize that the incumbent services in the range 7.125 - 7.7 GHz and 9.3 - 19.7 GHz provide important systems for public safety, aviation and other uses, and such operations should be protected. Sharing and compatibility studies are required to ensure the introduction of IMT into any band while protecting those incumbent operations in the same band or adjacent, as appropriate, and not unduly constrained.

The specific proposals for this WRC-27 agenda item are provided below:

PROPOSALS:

ADD USA/10/1

DRAFT NEW RESOLUTION [USA-10-2027] (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 should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;

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

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

[14] Remarks of Chairwoman Jessica Rosenworcel, "New Frontier of Partnerships", Mobile World Congress, Barcelona, Spain (March 1, 2022).

[15] *See generally Expanding Flexible Use of the 12.2-12.7 GHz Band*, Notice of Proposed Rulemaking, FCC 21-13, WT Docket No. 20-433 (2021); *Expanding Use of the 12.7-13.23 GHz Band for Mobile Broadband or Other Expanded Use*, Notice of Inquiry, FCC 22-80, GN Docket No. 22-352 (2022).

recognizing

a) that this conference has identified a number of urgent issues requiring further examination by WRC-27;

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

resolves

to recommend to the Council that a world radiocommunication conference be held in 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 WRC-23 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

…

1.[X] to consider identification of frequency bands within the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **[AI 10 IMT-2030 SPECTRUM] (WRC-23)**;

…

resolves further

to activate the Conference Preparatory Meeting,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-27,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To provide for studies in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range for the purpose of identifying frequency bands for the next generation of mobile technologies – IMT-2030.

ADD USA/10/2

DRAFT NEW RESOLUTION [AI 10 IMT- 2030 SPECTRUM] (WRC-23)

Studies on the identification of additional frequency bands for the terrestrial component of IMT between 7.125 - 7.7 GHz and 9.3 - 19.7 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;
b) that IMT systems have contributed to global economic and social development in support of a digital economy and society;
c) that IMT systems are now being evolved to provide diverse usage scenarios such as immersive communications, integrated sensing, integrated artificial intelligence and computing;
d) that ultra-low latency, very high bit-rate, and high sensing resolution applications of IMT will require larger contiguous blocks of spectrum (e.g. 500 MHz) for use by administrations wishing to implement IMT currently not available in existing mid-band frequency bands;
e) that frequency bands in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range are suitable to meet the 6G requirements for wide-area coverage, high capacity, low latency, and sensing;
f) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;
g) that adequate and timely availability of spectrum and corresponding regulatory provisions are essential to support the future development of IMT-2030;
h) that harmonized worldwide frequency bands and harmonized frequency arrangements for IMT are highly desirable in order to achieve global roaming and the benefits of economies of scale;
i) that a need exists to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service;
j) that the 8 025-8 400 MHz band hosts an EESS allocation globally on a co-primary basis with MetSat, FSS, fixed, and mobile allocations for important public safety as well as scientific Earth imaging;
k) that the frequency band 8 750–8 850 MHz is allocated to the aeronautical radionavigation service, and used extensively for airborne Doppler radar and ground mapping radar to determine ground speed, drift and distance travelled, as well as ground mapping, and must operate with an appropriate level of protection;.
l) that the frequency band 9 000 – 9 200 MHz is allocated to the radiolocation and aeronautical radionavigation services on a primary basis, and used for precision approach radar and airport surveillance detection equipment that must operate with an appropriate level of protection;
m) that the frequency band 9 300 – 9 500 MHz is allocated to the radionavigation service on a primary basis and the aeronautical radionavigation service in **5.475** is used by airborne weather radars that must operate with an appropriate level of protection;
n) the No. 5490 of the Radio Regulations indicates that in the band 12.2-12.7 GHz existing and future terrestrial radiocommunications services shall not cause harmful interference to the space services operating in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix 30;
o) that the frequency band 13.25-13.4 GHz is allocated to the aeronautical radionavigation service for Doppler navigation aids that must operate with an appropriate level of protection,

noting

a) that Resolution ITU-R 65 addresses the principles for the process of development of IMT for 2020 and beyond;
b) that IMT encompasses IMT-2000, IMT-Advanced and IMT-2020 collectively, as described in Resolution ITU-R 56-2 and the ITU is actively studying the development of IMT-2030;
c) that Question ITU-R 77-8/5 considers the needs of developing countries in the development and implementation of IMT;
d) that Question ITU-R 229/5 seeks to address the further development of IMT;
e) that Question ITU-R 262/5 addresses the study of usage of IMT systems for specific applications;
f) that Report ITU-R M.2370 analyses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demand for the period 2020 to 2030;
g) Report ITU-R M.2516, on future technology trends of terrestrial International Mobile Telecommunications systems towards 2030 and beyond,

recognizing

a) that there is a lead time between the allocation of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT;
b) that in order to ensure the future development of IMT it is important to ensure the timely identification of additional spectrum;
c) that any identification of frequency bands for IMT should ensure the protection of incumbent services in the same or adjacent frequency bands, as appropriate, and the evolving needs of these services;
d) that frequency bands in this range allocated to passive services on an exclusive basis are not suitable for an allocation to the mobile service;

resolves to invite the ITU Radiocommunication Sector

1 to study the technical and operational characteristics of the terrestrial component of IMT in the frequency range listed in *resolves to invite the ITU Radiocommunication Sector* 2, taking into account:

- the evolving spectrum needs to meet emerging demand for IMT;
- the evolution of IMT through advances in technology and spectrally efficient techniques;
- the deployment scenarios envisaged for IMT systems and the related requirements of combined wider area coverage, higher capacity and larger bandwidths;
- the needs of developing countries;
- the timeframe in which spectrum would be needed;

2 to conduct the appropriate sharing and compatibility studies[16], with a view to ensuring the protection of services with a primary allocation, without imposing additional regulatory or technical constraints on those services, in the frequency range of 7.125 - 7.7 GHz and 9.3 - 19.7 GHz[17],

resolves

1 to invite the first session of the Conference Preparatory Meeting for WRC-27 to define the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available to ensure that studies referred to in *resolves to invite the ITU Radiocommunication Sector 2* can be completed in time for consideration at WRC-27;

2 to invite WRC-27 to consider, based on the results of the above studies, additional spectrum allocations to the mobile service on a primary basis and to consider identification of frequency bands for the terrestrial component of IMT; the frequency bands to be considered being limited to part or all of the frequency band listed in *resolves to invite the ITU Radiocommunication Sector* 2,

invites administrations

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

Reasons: To provide for studies in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range for the purpose of identifying frequency bands for the next generation of mobile technologies – IMT-2030.

[16] Including studies with respect to primary services in the adjacent bands, as appropriate.

[17] Consideration of the 10.68 – 10.7 GHz band is excluded from this range (5.340).

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM FOR [IDENTIFICATION OF FREQUENCY BANDS FOR IMT]

Subject: Proposed future WRC-2027 agenda item to consider identification of the frequency bands within the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **[AI 10 IMT-2030 SPECTRUM] (WRC-23)**;

Origin: United States of America

Proposal: To conduct studies to identify frequency bands between 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range for use by IMT, seeking regional and global harmonization.

***Background/reason**:*
New wireless technologies and applications are driving an increase in demand for access to IMT spectrum. IMT-2030 technology will further increase this demand, particularly for large, contiguous spectrum bandwidths that are necessary to implement new use case scenarios and address traffic growth in mobile networks. To address the needs for envisioned IMT-2030 networks, spectrum in the 7.125 - 7.7 GHz and 9.3 - 19.7 GHz frequency range could facilitate the 2030 capacity-demanding use cases for both wider area coverage and higher capacity.

***Radiocommunication services concerned**:* Mobile Service, Fixed Service, Fixed Satellite Service, Mobile Satellite Service, EESS, Radio Astronomy and other services

***Indication of possible difficulties**:* The proposed bands are used by other services

***Previous/ongoing studies on the issue**:*
Related studies have been already commenced in ITU-R WP 5D.

Studies to be carried out by: ITU-R WP 5D	*with the participation of:* Administrations and Sector members of the ITU-R

***ITU-R Study Groups concerned**:* SG4, SG5 and SG7

***ITU resource implications, including financial implications (refer to CV126)**:* This proposed agenda item will be studied within the normal ITU-R procedures and planned budget. As the responsible group on IMT studies, ITU-R WP 5D usually conducts meetings three times a year which last at least 6 days each.

***Common regional proposal**:* Yes/No	***Multicountry proposal:*** Yes/No *Number of countries:*

Remarks

WRC-23 Agenda Item 10/WRC-27 Preliminary Agenda Item 2.9

IWG-2 members were not able to reach consensus on a proposal for WRC-23 Agenda Item 10/WRC-27 preliminary agenda item 2.9 and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Aviation Spectrum Resources Inc., Boeing, GPSIA, and Lockheed Martin.

View B is supported by AT&T, CTIA, Nokia, Samsung, T-Mobile, and Verizon.

VIEW A

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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,*

Draft Proposal to Exclude Preliminary Item 2.9 from the WRC-27 Agenda

Discontinuation of consideration of possible additional spectrum allocations to the mobile service in the frequency band 1 300-1 350 MHz in accordance with Resolution 250 (WRC-19)

Background:

At WRC-19, a preliminary agenda item (*resolves* 2.9) for WRC-27 was included in Resolution **812 (WRC-19)** for consideration of possible additional spectrum allocations for the mobile service in the frequency band 1 300-1 350 MHz in accordance with Resolution **250 (WRC-19)**. In Annex 1 to the Report of CPM23-2 to WRC-23, there is a statement that "[n]o draft CPM text has been developed on this WRC-27 preliminary agenda item."

The United States was a signatory to the CITEL IAP that proposed consideration of the 1 300-1 350 MHz band for inclusion on the agenda of WRC-23, and accepted the proposal's relegation to the preliminary agenda for WRC-27. After further consideration, the United States no longer supports inclusion of preliminary agenda item 2.9 on the agenda for WRC-27.

The main concern here is the impact that a mobile allocation in 1 300-1 350 MHz would inevitably have on adjacent-band radionavigation-satellite service (RNSS) systems operating immediately below 1 300 MHz. The 1215-1300 MHz band is allocated on a primary basis to the RNSS and other compatible primary services, including the earth exploration-satellite service (active) (EESS (active)). The U.S. Global Positioning System operates in the lower portion of the band; the Russian GLONASS system operates in the middle portion of the band; and the European Galileo system operates in the upper portion of the band (from 1260-1300 MHz). Together, the three RNSS systems are part of the Global Navigation Satellite System (GNSS), and millions of receivers including the capability to receive the low-power signals from all three RNSS systems are deployed worldwide today.

The 1300-1350 MHz band was studied for possible use by mobile broadband under WRC-15 Agenda item 1.1, and was rejected by consensus as a potential candidate for mobile broadband use. The ITU-R has reported that studies show that "if a higher-power, continuous-in-time signal in the same frequency band, or an adjacent band, is broadcast near an RNSS receiver, it could desensitize the RNSS receiver to the degree that the RNSS receiver is unable to extract the RNSS signal from space. As a result, frequency ranges near those used for the RNSS should not be identified for IMT." CPM Report for WRC-15, at Section 1/1.1/4.1.2.1 (emphasis added).Under WRC-15 agenda item 1.1, the ITU-R conducted studies on the compatibility with radars that operate in the 1 300-1 350 MHz band and all studies showed that co-frequency sharing with radars and the mobile services that were being considered under WRC-15 agenda item 1.1 in the same geographical area is not feasible. There is no expectation that studies under this preliminary agenda item if adopted for WRC-27 would have any different result.

The United States and CITEL had affirmative no-change proposals under WRC-15 AI 1.1 for the 1215-1300 MHz band for protection, inter alia, of RNSS, and WRC-15 itself concluded early in the conference "that no changes are required to the Radio Regulations as far as agenda item 1.1 is concerned for the frequency bands . . . 1215-1300 MHz [and] 1300-1350 MHz . . . ." Doc. WRC15/227.
The United States' proposal to discontinue consideration of preliminary WRC-27 agenda item 2.9 follows:
Proposals

SUP USA/10 (No 1 300-1 350 MHz Studies)/1

RESOLUTION 812 (WRC-19)

Preliminary agenda for the 2027 World Radiocommunication Conference

Reasons: This Resolution must be suppressed, as WRC-23 will create a new Resolution that will include the agenda for WRC-27, and the United States proposes that *resolves* 2.9 from Resolution **812 (WRC-19)** not be on that agenda.

SUP USA/10 (No 1 300-1 350 MHz Studies)/2

RESOLUTION 250 (WRC-19)

Studies on possible allocations to the land mobile service (excluding International Mobile Telecommunications) in the frequency band 1 300-1 350 MHz for use by administrations for the future development of terrestrial mobile-service applications

Reasons: Consequential to non-inclusion of *resolves* 2.9 from the preliminary WRC-27 agenda on the WRC-27 agenda adopted by WRC-23.

VIEW B

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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

Background

The importance of broadband connectivity was brought into sharp focus with COVID-19. The pandemic accelerated the uptake of broadband and the adoption of digital services by individuals and businesses, the digitalization of governmental services and spread of e-commerce.[18] In order to provide greater connectivity to all users and facilitate innovation in mobile communication applications, it is crucial to ensure that sufficient access to spectrum is available in a timely manner. As proposed by CITEL to WRC-19 for further study, the frequency band 1300 – 1350 MHz has the potential to provide additional spectrum access with desirable propagation characteristics for mobile communication applications.

In the U.S., the Bipartisan Budget Act of 2015 contained a Spectrum Pipeline Act section that directed the FCC, in coordination with Assistant Secretary, to identify minimum of 30 MHz spectrum below 3 GHz for auction by July 1, 2024. To that end, the Spectrum Efficient National Surveillance Radar (SENSR) program has been assessing the frequency band 1300 -1350 MHz for the feasibility of making the band available for reallocation for shared federal and non-federal use.

Mobile communication applications support a wide variety of economic activities, such as agriculture, education, healthcare, and industrial uses. It is important to continue to provide adequate spectrum in a variety of frequency bands to support different capabilities (e.g. coverage, capacity) for many different use cases. WRC-27 preliminary agenda item 2.7 remains of upmost importance and should be included in the WRC-27 agenda.

Proposals

SUP USA/10 (1300 Mobile)/1

[18] https://www.itu.int/hub/publication/s-pol-broadband-26-2022/

RESOLUTION 812 (WRC-19)

Preliminary agenda for the 2027 World Radiocommunication Conference

Reasons: This Resolution must be suppressed, as WRC-23 will create a new Resolution that will include the agenda for WRC-27.

ADD USA/10 (1300 Mobile)/2

RESOLUTION [A10] (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 WRC-27;

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 WRC-19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

1.x to consider possible additional spectrum allocations to the mobile service in the frequency band 1 300-1 350 MHz to facilitate the future development of mobile-service applications, in accordance with Resolution **250 (WRC-23)**;

. . .

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, 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 WRC-27;

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.

Reason: To provide greater connectivity to all users and facilitate innovation in mobile communication applications, it is crucial to ensure that sufficient access to spectrum is available in a timely manner. This proposal considers possible allocations to land mobile service in the 1 300 – 1 350 MHz to provide additional spectrum access for mobile communication applications.

MOD USA/10 (1300 Mobile)/3

RESOLUTION 250 (WRC-19)

Studies on possible allocations to the land mobile service ~~(excluding International Mobile Telecommunications)~~ in the frequency band 1 300-1 350 MHz for use by administrations for the future development of terrestrial mobile-service applications

The World Radiocommunication Conference (Dubai, 2023~~Sharm el-Sheikh, 2019~~),

considering

a) that mobile connectivity contributes to global economic and social development;

b) that demand has been increasing steadily for mobile communication services throughout the world;

c) that mobile services play a large and increasing role in connecting users to the Internet;

d) that technological advancement and user needs will promote innovation and accelerate the further development of communication applications;

e) that timely availability of spectrum is important to support future applications;

f) that all studies leading up to WRC-15 between radars and International Mobile Telecommunications (IMT) in the frequency range 1 300-1 350 MHz concluded, based on the parameters provided at that time, that within the same geographical area co-frequency operation of mobile-broadband systems and radar was not feasible;

g) that there is widespread usage of this frequency range in some countries for radar;

h) that WRC-15 noted that in countries where the frequency band is not fully used by these systems, studies were undertaken in the ITU Radiocommunication Sector that showed sharing may be feasible in those countries, subject to various mitigation and coordination measures, however no conclusions were drawn as to their applicability, complexity, practicability or achievability;

i) that some administrations are considering the feasibility of spectrum refarming/relocating some services operating in portions of the frequency band 1 300-1 350 MHz for the land mobile service (LMS), which requires a significant investment;

j) that advanced spectrum sharing techniques are under development that could facilitate additional utilization of spectrum by a number of different services in operation;
k) the need to protect existing services when considering frequency bands for possible additional allocations to any service,

recognizing

a) that the frequency band 1 300-1 350 MHz is allocated to the radiolocation service, the aeronautical radionavigation service and the radionavigation-satellite service (RNSS) on a primary basis;
b) that the RNSS (space-to-Earth) (space-to-space) is allocated, among others, on a primary basis in the adjacent frequency band 1 240-1 300 MHz;
c) that No. **5.149** calls for administrations to take all practicable steps to protect the radio astronomy service from harmful interference in the frequency band 1 330-1 400 MHz, which includes spectral lines of importance for current astronomical investigations,

resolves to invite the ITU Radiocommunication Sector

1 to develop technical and operational characteristics of LMS systems in the frequency band 1 300-1 350 MHz;
2 to conduct sharing and compatibility studies to ensure protection of those services to which the frequency band is allocated on a primary basis, and adjacent frequency bands as appropriate, taking into account *considering f),* for the frequency band 1 300-1 350 MHz;
3 to complete these studies by WRC-27,

invites the 2027 World Radiocommunication Conference

to consider, on the basis of the studies conducted under *resolves to invite the ITU Radiocommunication Sector* above, possible allocations to the LMS.

ATTACHMENT
PROPOSAL FOR FUTURE AGENDA ITEM FOR WRC-27

Subject: Proposed Future WRC Agenda Item for WRC-2027 to consider, based on the results of studies, possible allocations to the land mobile service in the frequency band 1 300-1 350 MHz
Origin: United States of America

Proposal: to consider possible allocations to the land mobile service to facilitate the future development of mobile communication applications, in accordance with Resolution **250 (WRC-23)**

Background/reason:
In order to provide greater connectivity to all users and facilitate innovation in mobile communication applications, it is crucial to ensure that sufficient access to spectrum is available in a timely manner. This proposal considers possible allocations to land mobile service in the 1 300 – 1 350 MHz to provide additional spectrum access for mobile communication applications.

Radiocommunication services concerned:
Aeronautical Radionavigation, Radiolocation, Radionavigation-Satellite

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Previous studies have focused on specific applications of the mobile service.

Studies to be carried out by: ITU-R Working Party 5A	*with the participation of:* Working Party 5B and Working Party 4C

ITU-R Study Groups concerned: SG5 and SG4

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Remarks

Preliminary Agenda for WRC-27

Assigned to IWG-2

With respect to the items assigned to IWG-2 regarding the Preliminary agenda for WRC-27, IWG-2 provides the following feedback:

Preliminary agenda for WRC-27 listed in Resolution 812 (WRC-19)	**IWG Views/Proposals**
2.4 the introduction of power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits in Article **21** for the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC-19)**;	IWG-2 members have been participating in IWG-3 discussions working to merge WRC-27 preliminary agenda items 2.4 and 2.5.
2.9 to consider possible additional spectrum allocations to the mobile service in the frequency band 1 300-1 350 MHz to facilitate the future development of mobile-service applications, in accordance with Resolution **250 (WRC-19)**;	IWG-2 members were not able to reach consensus on a proposal for WRC-23 Agenda Item 10/WRC-27 preliminary agenda item 2.9 and, therefore, forwards two views on how the FCC should handle this matter. See Document WAC-23-079.
2.12 to consider the use of existing International Mobile Telecommunications (IMT) identifications in the frequency range 694-960 MHz, by consideration of the possible removal of the limitation regarding aeronautical mobile in IMT for the use of IMT user equipment by non-safety applications, where appropriate, in accordance with Resolution **251 (WRC-19)**;	IWG-2 noted the preliminary agenda item 2.12 originated by a CEPT proposal and believes further consideration should occur in the USA WRC delegation process once other regional proposals are considered.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.12

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)****;*

Background:

This agenda item seeks a new secondary allocation to the Earth exploration-satellite service (EESS) (active) for spaceborne radar sounders within a range of frequencies around 45 MHz while taking into account the protection of incumbent services including those in adjacent bands. 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.

The sharing studies focused on sharing and compatibility of the spaceborne VHF radar sounder under investigation with respect to the incumbent services, both within its 40-50 MHz occupied BW as well as in adjacent bands. The results only considered interference from a single radar sounder and did not take into account aggregate interference effects from multiple sounders. The results indicate that in both static and dynamic study scenarios analysed, the operation of VHF radar sounder will exceed the interference protection criteria of the incumbent services.

Summary of studies for the most representative sharing scenarios

Victim scenario description	**Maximum received interference power P_r (dBW)**	**Maximum IEL (dB)**	**Percentage of time of IPC exceedance assuming transmission $D_{op} \times 100\%$ = 10.79% of the time)**	**considerations**
FIXED (rural)	-117.66	24.62		There were occurrences of interference where the incumbent IPC was exceeded.
MOBILE (-10 dB IPC) (rural)	-116.75	26.29	0.0739	There were occurrences of interference.

BROADCASTING (DRM) (rural)	-112.14	39.88	0.1381	There were occurrences of interference where the incumbent IPC was exceeded.
Space research (rural)	-140.71	17.13	0.0113	There were occurrences of interference where the incumbent IPC was exceeded.
Radiolocation (rural)	-108.32	28.56	0.0866	There were occurrences of interference where the incumbent IPC was exceeded.
Oceanographic radar (rural)	-142.87	13.08	0.0226	There were occurrences of interference where the incumbent IPC was exceeded.
WPR, Rec. ITU-R M.1226-0, (0°, 0°) (rural)	-56.08	68.35	0.0809	Due to the limited deployment of WPR in this band, cases of harmful interference may be addressed via case-by-case coordination between concerned administrations
AMATEUR (rural)	-149.07	-3.27	0	There were occurrences of interference where the incumbent IPC was exceeded.

Proposal:

NOC USA/1.12/1

ARTICLES

Reason: In order to ensure the protection of incumbent services in the 40 – 50 MHz frequency range, as well as in adjacent bands, no change is proposed.

NOC USA/1.12/2

APPENDICES

Reason: Sharing and compatibility studies have not demonstrated incumbent services could be protected from potential harmful interference from the operation of spaceborne radar sounders in the frequency band 40-50 MHz.

SUP USA/1.12/3

RESOLUTION 656 (REV.WRC-19)

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

Reason: Consequential action.

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WRC-23 Agenda Item 1.13

IWG-3 members were not able to reach consensus on a proposal for WRC-23 agenda item (AI) 1.13 and, therefore, it forwards two views on how the FCC could handle this matter.

View A is supported by CTIA

View B is supported by Lockheed Martin

VIEW A

IWG-3/069- AI 1.13 (CTIA)

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.13

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)**;*

Background:

Resolution **661 (WRC-19)** invites ITU-R to investigate and identify all relevant scenarios that need to be considered in assessment of a possible upgrade to the allocation to the space research service to primary status in the frequency band 14.8-15.35 GHz, and to conduct and complete such studies in time for WRC-23 so as to determine any associated technical and regulatory conditions to ensure protection of the current use and future development of the existing primary services.

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. 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. Based on the results of studies, cases of interference to incumbent fixed and mobile (including aeronautical mobile) services was found. In addition, reverse studies were conducted to evaluate the impact of incumbent terrestrial systems on SRS earth station and space station receivers, and it was shown there would be an impact. In addition, in the adjacent band, compatibility of SRS and RAS operations was not established by studies without significant OoB suppression. Based on the studies conducted, six methods were developed for the draft CPM text.

Proposal:

NOC USA/1.13/1

ARTICLES

Reason: In order to ensure the protection of incumbent services, the existing SRS allocation should remain secondary.

NOC USA/1.13/2

APPENDICES

Reason: In order to ensure the protection of incumbent services, the existing SRS allocation should remain secondary.

SUP USA/1.13/3

RESOLUTION 661 (WRC-19)

Examination of a possible upgrade to primary status of the secondary allocation to the space research service in the frequency band 14.8-15.35 GHz

Reason: Consequential action.

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VIEW B

IWG-3_088_AI1.13 (03.20.2023)
Author: S. Kotler (Lockheed Martin)

WRC-23 AGENDA ITEM 1.13 (14.8-15.35 GHZ)

VIEW B

View B supports that the U.S. adopt a proposal for WRC-23 to upgrade the Space Research Service allocation in the frequency band 14.8-15.35 GHz for space-to-space to primary while retaining Space Research Service as secondary for space-to-Earth and Earth-to-space directions. The U.S. Table of Frequency Allocations already has a Federal primary Space Research Service spectrum allocation in the 14.8-15.35 GHz band that can be used for space-to-space, space-to-Earth, or Earth-to-space operations, a primary Federal Mobile and secondary Federal fixed allocation in the frequency band 14.8-15.1365 GHz, and primary Federal Fixed and secondary Federal Mobile allocations in the frequency band 15.1365-15.35 GHz. However, while the U.S. Table of Frequency Allocations does permit per footnote US310 limited non-federal use of the space research service in a portion of the band on a secondary basis, the U.S. Table of Frequency Allocations have no non-federal fixed or mobile spectrum allocations in the 14.8-15.35 GHz band. ITU-R studies showed that Space Research Service (space-to-space) for Earth orbiting satellites can meet the protection levels of incumbent fixed and mobile services based on pfd limits in Recommendations ITU-R SA.510 and able to maintain margin above the SRS protection criteria in the current environment. The Space Frequency Coordination Group in its Recommendation SFCG 32-2R4 included the frequency band 14.5-15.35 GHz for Lunar Relay to Lunar Relay Cross Link. Upgrading the Space Research Service (space-to-space) allocation in the frequency band 14.8-15.35 GHz to Primary should provide greater regulatory certainties for long term investments by space and other industries.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.13

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)**;*

Background:

Resolution **661 (WRC-19)** invites ITU-R to investigate and identify all relevant scenarios that need to be considered in assessment of a possible upgrade to the allocation to the space research service to primary status in the frequency band 14.8-15.35 GHz, and to conduct and complete such studies in time for WRC-23 so as to determine any associated technical and regulatory conditions to ensure protection of the current use and future development of the existing primary services.

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. 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 constrain the operation of systems operating in other primary services in the frequency band. Studies involving SRS operation in the space-to-space direction showed protection levels of incumbent services are met based on pfd limits in Recommendation ITU-R SA.510 between SRS (space-to-space) and the fixed and mobile services in the frequency band 14.8-15.35 GHz. The scenarios involving beyond Earth-orbiting/lunar region crosslinks under a space research service space-to-space primary allocation provide further separation distance with incumbent fixed and mobile services on the Earth.

Proposals:

MOD USA/1.13/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

14.5-15.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14.8-15.35	FIXED MOBILE SPACE RESEARCH (space-to-space) Space research (Earth-to-space) (space-to-Earth) 5.339	

Reasons: Modifications to Article 5 to upgrade Space Research (space-to-space) while retaining Space Research (Earth-to-space) and Space Research (space-to-Earth) as secondary only.

MOD USA/1.13/2

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section V − Limits of power flux-density from space stations

TABLE **21-4** (*continued*) (Rev.WRC-~~19~~23)

Frequency band	Service*	Limit in dB(W/m^2) for angles of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
…	…	…	…	…	…
14.8-15.35 GHz	Space research (space-to-space)	−124	−124 + 0.5(δ − 5)	−114	1 MHz
…	…	…	…	…	…

Reason: Modifications to Table 21-4 to include PFD limits to protect the fixed and mobile services from Space Research (space-to-space) transmissions.

SUP USA/1.13/3

RESOLUTION 661 **(**WRC-19**)**

Examination of a possible upgrade to primary status of the secondary allocation to the space research service in the frequency band 14.8-15.35 GHz

Reason: Consequential action.

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UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.14

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

Background:

The objective of WRC-23 agenda item 1.14 is to review and consider possible adjustment of the existing or possible new primary frequency allocations to the 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 without unduly constraining the operation of other primary services currently allocated in this frequency range. Resolution **662 (WRC-19)** resolves to study modifications to EESS (passive) allocations and invites WRC-23 to consider adjusting existing allocations or adding possible new allocations, as appropriate, to the EESS (passive) in the frequency range 231.5-252 GHz. Modifications to other allocations in this frequency range are out of scope of this agenda item.

EESS (passive) microwave sensing in this rangre mainly includes Ice Cloud Measurements and atmosphere gases measurement. The Ice Cloud Imager (ICI) instrument which is a conical scanning millimeter/sub-millimeter wave radiometer, performs measurements 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.

Compatibility studies show that, in the frequency band 239.2-242.2 GHz, the sharing between the conical scanning passive sensors (like ICI) and systems of fixed service (FS)/mobile service (MS) is not feasible (a negative margin of – 34 dB). Studies also show that limb sounding passive sensors are compatible with systems of 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.

For the radiolocation service, no sharing and compatibility studies are performed as there are no technical characteristics for radiolocation service in the frequency band 238-248 GHz in ITU-R Recommendation or Reports. For the radionavigation and radionavigation-satellite service, no sharing and compatibility studies are performed as there are no technical characteristics available for radionavigation and radionavigation satellite services in the frequency band 238-240 GHz in ITU-R Recommendation or Reports.
It should be noted that sharing and compatibility studies were performed with the fixed and mobile service in the 235 – 238 GHz band, and such use was found to be compatible (positive interference margin of > 14 dB). As any changes (suppression or addition) of terrestrial services are out of scope of

Resolution **662 (WRC-19)**, a future competent Conference may consider the results of these studies called for under Resolution **731 (WRC-19)**[19].

Proposal:

MOD USA/1.14/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

[19] From **Resolution 731 (WRC-19):**

resolves

to invite a future competent world radiocommunication conference to consider the results of ITU-R studies referred to in invites the ITU Radiocommunication Sector below with a view to taking the necessary action, as appropriate, in order to accommodate the emerging requirements of active services, taking into account the requirements of the passive services, in frequency bands above 71 GHz,

urges administrations

to note the possibility of changes to Article **5** to accommodate emerging requirements for active services, as indicated in this Resolution, and to take this into account in the development of national policies and regulations,

invites the ITU Radiocommunication Sector

1 to continue its studies to determine if and under what conditions sharing is possible between active and passive services in the frequency bands above 71 GHz, such as, but not limited to, 100-102 GHz, 116-122.25 GHz, 148.5-151.5 GHz, 174.8-191.8 GHz, 226-231.5 GHz and 235-238 GHz;

200-248 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
232-235	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation	
235-238	EARTH EXPLORATION-SATELLITE (passive) ADD 5.B114 FIXED-SATELLITE (space-to-Earth) SPACE RESEARCH (passive) 5.563A 5.563B	
238-~~240~~239.2	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE	
~~238~~239.2-240	EARTH EXPLORATION-SATELLITE (passive) ADD 5.B114 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE	
240-241	EARTH EXPLORATION-SATELLITE (passive) ADD 5.B114 FIXED MOBILE RADIOLOCATION	
241-~~248~~242.2	EARTH EXPLORATION-SATELLITE (passive) ADD 5.B114 RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite ~~5.138~~ 5.149	
24~~1~~2.2-~~248~~244.2	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 5.149	
24~~4.21~~7.28	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 5.149	

247.21-248	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite ~~5.138~~ 5.149

Reason: Based on ITU-R studies performed, these modifications provide 6 GHz of additional spectrum to the Earth exploration-satellite service (passive) while not constraining incumbent fixed and mobile service operations.

ADD USA/1.14/2

5.B114 The use of the frequency band 235-238 and 239.2-242.2 GHz by the Earth exploration-satellite service (passive) is limited to the operation of limb sounding passive sensors. In the frequency band 239.2-242.2 GHz, stations in the Earth exploration-satellite (passive) service shall not claim protection from stations of the fixed and mobile services. (WRC-23)

Reason: In order to ensure the protection of incumbent terrestrial services and not constrain their future development, these EESS (passive) operations are limited to limb sounding and not claiming protection.

SUP USA/1.14/3

RESOLUTION 662 (WRC-19)

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

Reason: Consequential action.

WRC-23 Agenda Item 1.15

IWG-3 members were not able to reach consensus on a proposal for WRC-23 agenda item (AI) 1.15 and, therefore, it forwards two views on how the FCC could handle this matter.

VIEW A

Author: CTIA

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.15

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)**;*

Background:

WRC-23 agenda item 1.15 calls for studies on the possible operation of aeronautical and maritime earth stations in motion (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 12.75-13.25 GHz frequency band 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. The 12.75-13.25 GHz is also allocated globally to the fixed and mobile service on a primary basis.

ITU-R studies were conducted to consider the protection of stations operating in the terrestrial services from a possible new application of the fixed satellite service (FSS) ESIM operations. These studies include significant deficiencies such that it is impossible to conclude that protection of the current and planned systems of incumbent terrestrial services is ensured. The studies narrowly consider a single latitude of 51° N for operations of the terrestrial services, which combined with the satellite spacing and spot beam satellite coverage example, downwardly skews the number of visible GSO satellites and by association, the number of possible A-ESIM interference sources. Further decreasing this underestimation, the deployment density of A-ESIM is downwardly skewed by assuming the aircraft will be uniformly distributed across the satellite receive beam coverage and that the visible area of the terrestrial station will only marginally intersect with the satellite footprint at a ratio of approximately 1 to 8. Comparing to other frequency bands used for ESIMs (e.g. 29 GHz), at 12.75 GHz the path loss the interfering signal goes through is 6 dB less and therefore the range of its harmful impact on terrestrial increases accordingly. As seen in other ITU-R studies (e.g. WRC-19 agenda item 1.5 and WRC-23 agenda item 1.16), the case of airports and taxi/take off/landing is the limiting case which means the uniform distribution of ESIMs through the beam is not valid. The combination of these assumptions vastly underestimates the interference potential into terrestrial services. By way of comparison, these assumptions are inconsistent with studies conducted with other incumbent services under this Agenda item, like the aeronautical radionavigation service, which models the real-world behavior of the aircraft these A-ESIM seek to serve. For these reasons, the sharing studies have failed to demonstrate that protection is ensured for the current and planned systems of incumbent terrestrial services.

In the United States, the Federal Communications Commission (FCC) has opened a Notice of Inquiry (NOI) exploring how to expand the use of 550 megahertz of mid-band spectrum between 12.7 – 13.25 GHz for mobile broadband use as well as considerations on how to facilitate the international harmonization of the band. As noted in the Inquiry, "Mid-band spectrum in the 12.7 GHz frequency range combines favorable propagation characteristics and considerable capacity and opportunity for channel

reuse, as well as superior building penetration and reduced clutter loss as compared to high-band spectrum."

Proposal:

NOC USA/1.15/1

ARTICLES

Reason: In order to ensure the protection of incumbent terrestrial services and harmonize the 12.75-13.25 GHz band for mobile broadband operations.

NOC USA/1.15/2

APPENDICES

Reason: In order to ensure the protection of incumbent terrestrial services and harmonize the 12.75-13.25 GHz band for mobile broadband operations.

SUP USA/1.15/3

RESOLUTION 172 (WRC-19)

Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space)

Reason: Consequential action.

VIEW B

IWG-3/67R2
Author: Intelsat, SES

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)*

BACKGROUND

The demand for on the move connectivity services provided by earth stations on aircraft and vessels continues to grow as the importance and access to internet-based applications for the aviation and maritime industry as well as for their passengers increases. Given this reality, WRC-19 adopted agenda item 1.15 for WRC-23 to study the operation of earth stations on aircraft and vessels communicating with geostationary-satellite (GSO) fixed-satellite service (FSS) space stations and potential sharing and compatibility issues with incumbent services in the 12.75-13.25 GHz frequency band and primary services in adjacent bands. The use of the 12.75-13.25 GHz band by GSO FSS (Earth-to-space) is subject to Appendix **30B**.

Previous WRCs have adopted technical and regulatory provisions to allow aeronautical and maritime terminals to communicate with GSO FSS networks in other frequency bands:

1. Resolution **902 (WRC-03)** addresses the use of earth stations on board vessels communicating with GSO FSS networks in the bands 5925-6425 MHz and 14-14.5 GHz (RR No. **5.457A**);

2. Resolution **156 (WRC-15)** addresses the use of earth stations in motion (ESIM) communicating with GSO FSS networks in the 19.7-20.2 GHz and 29.5-30.0 GHz bands (RR No. **5.527A**);

3. Resolution **169 (WRC-19)** addresses the use of ESIMs communicating with GSO FSS networks n the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz (RR No. **5.517A**).

According to the result of the studies being conducted in ITU-R regarding agenda item 1.15, this proposal supports Method B, contained in the CPM Report, to deal with agenda item 1.15, which consists of establishing a new regulatory framework and setting new operating requirements for earth stations on aircraft and vessels in the frequency band 12.75–13.25 GHz (Earth-to-space). The results of the ITU-R studies needed to protect other services allocated in this frequency bands under, as well as the services to the adjacent bands in accordance with Resolution 172 (WRC-19).

These studies included protection of allotments to AP30B Plan, geostationary FSS systems operating under Appendix 30B in the List, non-geostationary FSS systems, earth exploration-satellite services, aeronautical radionavigation services, and the fixed and mobile terrestrial services. The ITU WP expert groups provided the technical parameters and protection criteria for their respective service. The technical and regulatory criteria contained in Method B of the CPM Report was developed in collaboration with these expert ITU-R Working Parties, including WP4A, WP5A, WP5B and WP5C, WP7C as required.

ARTICLE 5

Frequency allocations

Section IV – Frequency band allocation table

(See No. 2.1)

MOD USA/1.15/1

11.7-13.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
12.75-13.25	FIXED FIXED-SATELLITE (Earth-to-space) 5.441 ADD 5.A115 MOBILE Space research (outer space) (space-to-Earth)	

ADD USA/1.15/2

5.A115 Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service operating in the frequency band 12.75-13.25 GHz (Earth-to-space) shall be subject to the application of Resolution **[A115] (WRC-23)**. (WRC-23)

ADD USA/1.15/3

DRAFT NEW RESOLUTION [115] (WRC-23)

Use of the frequency band 12.75-13.25 GHz by earth stations in motion on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC Orb-88 established an Allotment Plan for the use of the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz;

b) that WRC-07 revised the regulatory regime governing the use of the frequency bands referred to in *considering a)* above;

c) that the objective of providing broadband mobile satellite communications may also be met by allowing earth stations in motion (ESIMs), on aircraft (A-ESIMs) and vessels (M-ESIMs), to communicate with the geostationary space stations of a fixed-satellite network in the frequency bands 12.75-13.25 GHz (Earth-to-space) and the associated downlink frequency bands of that satellite;
d) that the frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the fixed-satellite service (FSS) (Earth-to-space), fixed and mobile services and on a secondary basis to the space research (deep space) (space-to-Earth) service;
e) that the operation of services to which the frequency band 12.75-13.25 GHz is allocated and those in adjacent bands needs to be protected from A-ESIM and M-ESIM;
f) that the frequency band 12.75-13.25 GHz (Earth-to-space) is used by the geostationary-satellite orbit (GSO) FSS in accordance with the provisions of Appendix **30B** (RR No. **5.441**) and that there are many existing GSO FSS satellite networks operating in this frequency band;
g) that the objective of the procedures in Appendix **30B** is to guarantee, for all countries, equitable access to the GSO in the frequency bands of the FSS covered by this Appendix;
h) that appropriate regulatory and interference-management mechanisms, including necessary mitigation measures and associated techniques are required for the operation of A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz (Earth-to-space) to protect other space and terrestrial services in this frequency band as well as services in adjacent frequency bands and without adversely affecting those services and their future development, taking into account the provisions of Appendix **30B** (see also *resolves further* 1 to 5 on responsibilities);
i) that, in Appendix **30B**, the frequency bands in the space-to-Earth direction corresponding to the frequency band 12.75-13.25 GHz (Earth-to-space) are 10.7-10.95 GHz and 11.2-11.45 GHz, which may be used by A-ESIM and M-ESIM, subject to not claiming protection from other services and applications of the FSS and other radiocommunication services to which the frequency band is allocated;
j) that there is no publicly available information on coordination agreements reached among administrations regarding GSO FSS satellite networks except whether coordination has been completed, which is provided to, and published by the Radiocommunication Bureau (BR);
k) that the operation of A-ESIMs and M-ESIMs requires the establishment of one or more gateway earth station facilities in one or several countries that are within the service area of the associated satellite network and that are authorized by the administration of the territory where such earth stations are located,

considering further

a) that A-ESIMs and M-ESIMs operating within the agreed service area of the satellite networks with which they communicate may provide service within the territories under the jurisdiction of multiple administrations;
b) that the operation of ESIMs within the territory under the jurisdiction of administrations/countries mentioned in *considering further a)* above is subject to obtaining authorization from those administrations;
c) that the frequency band 12.75-13.25 GHz is used by a variety of different systems and these existing services and their future development need to be protected, without any undue constraints, from the operation GSO ESIMs,
d) there is not specific regulatory procedure for the coordination on GSO ESIMs relative to terrestrial stations for these services;
e) that the operation of A-ESIM and M-ESIM shall comply with provision RR No. **5.340**;

f) that when the Appendix **30B** GSO FSS satellite network with which A-ESIMs and M-ESIMs communicate transmits in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz, it shall operate under the levels that were coordinated and included in the List, and these Appendix **30B** satellite transmissions will not change to accommodate A-ESIMs and M-ESIMs;

g) that the operation of A-ESIMs and M-ESIMs in the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz shall not adversely affect the allotments in the Plan nor the assignments in the List,

recognizing

a) that Article 44 of the ITU Constitution contains the basic principles for the use of the radio-frequency spectrum and the GSO and other satellite orbits, taking into account the needs of developing countries;
b) that administrations intending to authorize A-ESIMs and M-ESIMs, when establishing national licensing rules, may consider adopting other interference management procedures and/or mitigation measures than those contained in this Resolution;
c) that, pursuant to the relevant paragraph in Appendix **30B**, the operation of ESIM in the frequency band 12.75-13.25 GHz is within the service area of the Appendix **30B** network for which explicit agreement has been obtained;
c bis) that § 6.16 of Article 6 of Appendix **30B** provides the opportunity to any administration at any time to request that its territory be excluded from the service area of any assignment governed by Appendix **30B**;
d) that the operation of an A-ESIM or M-ESIM communicating with a space station of a given satellite network inter alia requires that earth station is within the coordinated and agreed service area of that satellite, under the relevant provisions of Appendix **30B**;
e) that, based on the available information in the Bureau's database in May 2022, there is no contiguous regional or worldwide coordinated and agreed service area for any satellite using Appendix **30B** frequency band 12.75-13.25 GHz recorded in the Master International Frequency Register (MIFR);
f) that, in order for A-ESIM and M-ESIM to operate in the frequency band 12.75-13.25 GHz (Earth-to-space) of Appendix **30B** in the most efficient and operationally viable manner, having a contiguous regional or worldwide coordinated and agreed service area is an important issue to be taken into account;
g) that the administration authorizing ESIMs on the territory under its jurisdiction has the right to require that the ESIMs referred to above only use those assignments associated with GSO FSS networks which have been successfully coordinated, notified, brought into use and recorded in the MIFR with a favourable finding under § 8.11 of Article 8 of the Appendix **30B**, except those arising from the application of § 6.25 of Appendix **30B**;
h) that WRC-19 adopted Resolution **170 (WRC-19)**, which provides the procedure to enhance equitable access to frequency bands under Appendix **30B** by developing countries;
i) that the protection of current usage and future development of Appendix **30B** in the frequency band 12.75-13.25 GHz (Earth-to-space) is fundamental;
j) that the availability of the methodology to examine conformity to the power flux-density (pfd) limit as contained in Annex 2 to this Resolution is a fundamental and crucial element;
k) that there is need to establish regulatory, technical and recording procedures for the usage of these type of ESIMs that may differ from the current FSS Appendix **30B** Plan and List recording procedures;
l) that successful compliance with this Resolution does not oblige any administration to authorize/license earth stations on aircraft and vessels communicating with geostationary space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) to operate within the territory under its jurisdiction (see *resolves* 7);

recognizing further
a) that under *resolves* 1.1.3 of this Resolution frequency assignments to ESIMs need to be notified to the BR;
b) that, for the operation of ESIMs, notification of any frequency assignment under Annex 1 of this Resolution shall only be made by one single administration;

c) that, an administration authorizing the operation of ESIMs within the territory under its jurisdiction may modify/withdraw that authorization at any time,

resolves

1 that, for any earth station on aircraft and vessels communicating with a GSO FSS space station within the frequency band 12.75-13.25 GHz (Earth-to-space), or parts thereof, the following conditions shall apply:

1.1 with respect to space services in the frequency band 12.75-13.25 GHz and adjacent bands, A-ESIM and M-ESIM shall comply with the following conditions:

1.1.1 the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by A-ESIM and M-ESIM shall not result in any changes or restrictions to the allotment in the Plan, assignments in the List of Appendix **30B**, and those recorded in the MIFR including the assignments arising from the implementation of Resolution **170 (WRC-19)**;

1.1.2 with respect to satellite networks or systems of other administrations, the characteristics of A-ESIM and M-ESIM shall remain within the envelope of typical characteristics of notified earth stations associated with the satellite networks with which these earth stations communicate, as published by the Bureau and included in relevant International Frequency Information Circular (BR IFIC), and Annex 1 applies;

1.1.2*bis* the use of A-ESIM and M-ESIM shall not cause any interference to Appendix **30B** allotments, assignments received by the Bureau under Article 6 either in process or yet to be processed, assignments in the List, assignments notified under Article 8 of that Appendix, and assignments recorded in the MIFR as well as submission under Appendix **30B** beyond that specified in relevant Annexes to that Appendix;

1.1.3 for the implementation of *resolves* 1.1.1, 1.1.2 and 1.1.2bis above, the notifying administration for the GSO FSS network with which the above-mentioned earth stations communicate shall follow the procedure in Annex 1 of this Resolution, together with the commitment that the operation shall be in conformity with the Radio Regulations, including this Resolution;

1.1.4 upon receipt of the notification information referred to in *resolves* 1.1.3 above, the BR shall process the submission in accordance with Annex 1 of this Resolution;

1.1.5 for the protection of non-GSO FSS systems operating in the frequency band 12.75-13.25 GHz, the above-mentioned earth stations communicating with GSO FSS networks referred to above shall comply with the provisions contained in Annex 3 of this Resolution;

1.1.6 the notifying administration of the GSO FSS network with which the above-mentioned earth stations communicate shall ensure that the operation of these earth stations complies with the coordination agreements for the frequency assignments of the earth station of this GSO FSS satellite network of Appendix **30B** obtained under the relevant provisions of that Appendix;

1.2 with respect to the protection of terrestrial services to which the frequency band 12.75-13.25 GHz is allocated and that operate in accordance with the Radio Regulations, A-ESIM and M-ESIM shall comply with the following conditions:

1.2.1 transmitting A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz (Earth-to-space) shall not cause unacceptable interference to terrestrial services to which this frequency band is allocated and that operate in accordance with the Radio Regulations, and Annex 2 to this Resolution shall apply;

1.2.2 the receiving part of the above-mentioned earth stations in their associated frequency band shall not claim protection from terrestrial services to which this frequency band is allocated and that operate in accordance with the Radio Regulations;

1.2.3 the provisions in this Resolution, including Annex 2, set the conditions for the purpose of protecting terrestrial services from unacceptable interference from earth stations on aircraft and vessels in neighbouring countries in the frequency band 12.75-13.25 GHz; however, the requirement to not cause unacceptable interference to terrestrial services to which the frequency band is allocated and that operate in accordance with the Radio Regulations remains valid, irrespective of compliance with that Annex (see *resolves* 7);

1.2.4 for the application of Part II of Annex 2 as referred to in *resolves* 1.2.1 above, the BR shall examine the characteristics of earth stations on board aircraft with respect to the conformity with the pfd limits on the Earth's surface specified in Part II of Annex 2, and publish the results of such examination in the BR IFIC;

1.2.5 the compliance with the pfd mask mentioned above does not release the notifying administration of the A-ESIM and M-ESIM with respect to discharging its responsibility that such earth stations shall not cause unacceptable interference and any interrelated receiving part shall not claim protection from the terrestrial stations;

1.2.6 should administrations authorizing A-ESIM agree to pfd levels higher than the limits contained in Part II of Annex 2 within the territory under its jurisdiction, such agreement shall in no way affect other countries that are not party to that agreement;

1.3 with respect to the aeronautical radionavigation systems operating in the frequency band 13.25-13.4 GHz, A-ESIM and M-ESIM communicating with GSO FSS networks shall not cause unacceptable interference to nor claim protection from the aeronautical radionavigation service (ARNS) operating in accordance with the Radio Regulations in the 13.25-13.40 GHz band;

2 that only frequency assignments of Appendix **30B** recorded in the List can be used as supporting assignments by A-ESIMs and M-ESIMs communicating with GSO networks in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space), if those assignments are recorded in the MIFR with favourable finding under § 8.11 of Article 8 of Appendix **30B**;

3 that operation of A-ESIM and M-ESIM communicating with GSO space stations in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) shall be within the coordinated and notified service area of the GSO FSS network with which the earth stations communicate;

4 that, for the implementation of *resolves* 3 above, the notifying administration for the GSO FSS network with which the A-ESIM and M-ESIM communicate shall ensure that necessary arrangements and switching facilities are built into the above-mentioned earth stations to cease emissions once approaching the territory under the jurisdiction of those administrations which either are not within the notified and coordinated service area of the subject space station or have not authorized the operation over their territories;

5 that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments of the GSO FSS satellite network with which earth stations on aircraft and vessels communicate, or on the coordination requirements of that satellite network;

6 that A-ESIM and M-ESIM shall not be used or relied upon for safety-of-life applications;

7 that the operation of A-ESIM and M-ESIM within territorial waters and/or airspace under the jurisdiction of an administration shall be carried out only if a licence according to No. **18.1** of the Radio Regulations/authorization of that administration is obtained;

8 that gateway earth station facilities for A-ESIM and M-ESIM shall be within the service area of the satellite network associated to that gateway;

8bis that the operation of ESIM at sea is subject to the application of decisions of previous WRCs, in particular WRC 19, and past practices of the Bureau;

9 that, in the case unacceptable interference caused by A-ESIM and/or M-ESIM is reported:

9.1 the notifying administration of the GSO FSS network with which the ESIM communicates, assisted by the authorizing administration on the territory under the jurisdiction where the earth station operates, to the extent of the ability of the latter administration, shall undertake an investigation on the

matter and provide the required information to the administration reporting unacceptable interference on the operation of those earth stations;
9.2 the notifying administration of the GSO FSS network with which the ESIMs communicate shall take the required action to eliminate or reduce interference to an acceptable level;
10 that the administration responsible for the GSO FSS satellite supporting assignment with which earth stations on aircraft and vessels communicate shall ensure:
10.1 that for the operation of A-ESIM and M-ESIM, techniques are employed to maintain pointing accuracy with the associated GSO FSS satellite, without inadvertently tracking adjacent GSO satellites;
10.2 that all necessary measures shall be taken so that earth stations on aircraft and vessels are subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility in order to comply with the provisions in this Resolution, and are capable of receiving and acting upon at least "enable transmission" and "disable transmission" commands from the NCMC or equivalent facility;
10.3 that measures, when required, are to be taken to limit transmission of the A-ESIM and/or M-ESIM on the territory, including territorial waters and territorial airspace, under the jurisdiction of the authorizing administration of the operation of the above-mentioned earth stations;
10.4 that a permanent point of contact shall be designated and provided by the notifying administration of the GSO FSS network for the purpose of tracing any suspected cases of unacceptable interference from earth stations on aircraft and vessels and to immediately respond to requests from the focal point of the authorizing administration,

resolves further

1 that frequency assignments in the frequency band 12.75-13.25 GHz (Earth-to-space) by A-ESIM and M-ESIM communicating with geostationary space stations in the FSS shall be notified by the notifying administration of the satellite network with which the ESIM communicates;
2 that the notifying administration of the satellite network shall ensure that ESIMs operate only in the territory under the jurisdiction of an administration from which an authorization has been obtained, taking into account *recognizing further c)* above;
3 that, for the implementation of *resolves further* 2 above, the notifying administration of the satellite network with which ESIMs communicate shall ensure that ESIMs are designed and operate so as to cease transmission in the territory of any administration from which authorization has not been obtained;
4 that, for the implementation of *resolves further* 1 above, the notifying administration responsible for the operation of A-ESIM and M-ESIM shall also be responsible for observing and complying with all relevant regulatory and administrative provisions applicable to the operation of the above-mentioned ESIMs as included in this Resolution and those contained in the Radio Regulations;
5 that the authorization for an ESIM to operate in the territory under the jurisdiction of an administration shall in no way release the notifying administration of the satellite network with which the ESIM communicates from the obligation to comply with the provisions included in this Resolution and those contained in the Radio Regulations,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, when required;
2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution, including whether or not the responsibilities relating to the operation of A-ESIMs and M-ESIMs have been properly addressed;

invites administrations

to collaborate for the implementation of this Resolution, in particular for resolving interference, if any,

instructs the Secretary-General

1 to bring this Resolution to the attention of the Council with a view to consider if cost recovery should be applied to ESIM;

2 to bring this Resolution to the attention of the Secretary-General of the International Maritime Organization and of the Secretary General of the International Civil Aviation Organization.

ANNEX 1 TO DRAFT NEW RESOLUTION [A115] (WRC-23)

PART I

Procedure to be followed by the administrations and the Bureau for submission of the earth stations on board aircraft and vessels operating in the frequency band 12.75-13.25 GHz (Earth-to-space) and for the protection of allotments in the Plan, assignments in the Appendix 30B List and those submitted under Articles 6 and 7 of Appendix 30B as well as under Resolution 170 (WRC-19)

Section A – Procedure for entering assignments to earth stations on board aircraft and vessels in the Appendix 30B ESIM List[1]

1 When an administration or one acting on behalf of a group of named administrations intends to use one or more Appendix **30B** assignments already included in the List in support of the operation of A-ESIMs and M-ESIMs in the frequency band 12.75-13.25 GHz, it shall send to the Bureau, not earlier than 8 years but preferably not later than 2 years before the operation of A-ESIMs and M-ESIMs, the information specified in Appendix **4**[2].

An assignment in the Appendix **30B** ESIM List shall lapse if it is not brought into use within 8 years after the date of receipt by the Bureau of the relevant complete information specified above. A proposed assignment not included in the Appendix **30B** ESIM List within 8 years after the date of receipt by the Bureau of the relevant complete information shall also lapse.

1*bis* If the information received by the Bureau under § 1 is found to be incomplete, the Bureau shall immediately seek any clarification required and information not provided from the administration concerned.

[1] The List of assignments for earth station in motion (ESIM) in the frequency band 12.75-13.25 GHz in Appendix **30B**.

[2] Submissions may include only the frequency band 12.75-13.0 GHz or 13.0-13.25 GHz.

2 Upon receipt of a complete notice under § 1, the Bureau shall examine it with respect to its conformity with:

a) the Table of Frequency Allocations and the other provisions[3] of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the coordination procedures;

b) Annex 3 to Appendix **30B**;

c) the on-axis e.i.r.p. density and off-axis e.i.r.p. density of the supporting Appendix **30B** assignment(s);

d) the service area of the supporting Appendix **30B** assignment(s) in respect of explicit agreements of those administrations whose territories are included in the service area[4];

e) the frequency band of the supporting Appendix **30B** assignment(s) in the List in the frequency band 12.75-13.25 GHz.

3 When the examination with respect to § 2 leads to an unfavourable finding, the relevant part of the notice shall be returned to the notifying administration with an indication of the appropriate action.

4 When the examination with respect to § 2 leads to a favourable finding, the Bureau shall use the method of Annex 4 to Appendix **30B** to determine administrations whose:

a) allotments in the Plan; or

b) assignments which appear in the List; or

c) assignments which the Bureau has previously examined under § 6.5 of Article 6 of Appendix **30B** after receiving complete information in accordance with § 6.1 of that Article,

are considered as being affected and receiving more interference than that produced by the supporting Appendix **30B** assignment(s).

5 The Bureau shall publish, in a Special Section of its BR IFIC, the complete information received under § 1, together with the names of the affected administrations, the corresponding allotments in the Plan, assignments in the List and assignments for which the Bureau has previously received complete information in accordance with § 6.1 of Article 6 of Appendix **30B** and which it has examined under § 6.5 of that Article.

5*bis* The Bureau shall immediately inform the administration proposing the assignment, drawing its attention to the information contained in the relevant BR IFIC and the requirement to seek and obtain the agreement of those affected administrations.

6 The Bureau shall also inform each administration listed in the Special Section of the BR IFIC published under § 5, drawing its attention to the information it contains.

7 An administration that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the BR IFIC referred to in § 5 shall be deemed to have not agreed to the proposed assignment in respect of its allotment in the Plan, conversion of an allotment into an assignment for national coverage, Article 7 request transferred to Article 6, submission in accordance with Resolution **170 (WRC-19)**, assignments in the List of Appendix **30B**, and those recorded in the MIFR, according to the case for which absence of reply/comments shall construe their disagreement to the request for coordination. This time-limit shall be extended for an administration that has requested the assistance of the Bureau by up to thirty days following the date on which the Bureau communicated the result of its action. In respect of its frequency assignments under

[3] The "other provisions" shall be identified and included in the Rules of Procedure.

[4] The service area may be reduced by excluding certain countries for which explicit agreement was obtained.

Article 6 of Appendix **30B** other than those mentioned above, the same course of action outlined in § 6.10 of that Article shall apply.

8 Unless coordination is no longer required, the administration responsible for the notice published under § 5 shall seek and obtain the explicit agreement of the relevant affected administrations contained in the Special Section published under § 5 in respect of allotment in the Plan, conversion of an allotment into an assignment for national coverage, Article 7 request transferred to Article 6, submission in accordance with Resolution **170 (WRC-19)**, assignments in the List of Appendix **30B**, and those recorded in the MIFR, as appropriate. In this specific case of explicit agreement, any request for the assistance of the Bureau shall not change it to implicit/tacit agreement.

9 If agreements have been reached in accordance with §§ 7 and 8 with administrations published under § 5, the administration responsible for the notice published under § 5 may request the Bureau to have the assignment entered into the Appendix **30B** ESIM List, indicating the final characteristics of the notice[5] together with the names of the administrations with which agreement has been reached.

9*bis* In submitting such information, noting the requirement of § 1 of Section B, the administration may also request the Bureau to examine the submission in respect of notification under Section B.

9*ter* If the information received by the Bureau under §§ 9 and 9*bis* is found to be incomplete, the Bureau shall immediately seek any clarification required and information not provided from the administration concerned. The Bureau may also provide additional information in order to assist the notifying administration in complying with requirements under §§ 10, 12 and 13.

10 Upon receipt of a complete notice under § 9, the Bureau shall examine each assignment in the notice with respect to its conformity with:

a) the Table of Frequency Allocations and the other provisions[6] of the Radio Regulations, except those provisions relating to conformity with the FSS Plan and the procedures for obtaining coordination;

b) Annex 3 to Appendix **30B**;

c) the service area published under § 5;

d) the on-axis e.i.r.p. density and off-axis e.i.r.p. density of the assignments published under § 5, and

e) frequency band of the assignments published under § 5.

11 When the examination with respect to § 10 of an assignment received under § 9 leads to an unfavourable finding, the notice shall be returned to the notifying administration with an indication that subsequent resubmission under § 9 will be considered with a new date of receipt.

12 When the examination with respect to § 10 of an assignment received under § 9 leads to a favourable finding, the Bureau shall use the method of Annex 4 to examine if there is any administration and the corresponding:

a) allotment in the Plan;

b) assignment which appears in the List at the date of receipt of the examined notice submitted under § 1;

c) assignments which the Bureau has previously examined under § 6.5 of Article 6 of Appendix **30B** after receiving complete information in accordance with § 6.1 of that Article at the date of receipt of the examined notice submitted under § 1[7],

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[5] Submissions may include only the frequency band 12.75-13.0 GHz or 13.0-13.25 GHz.

[6] The “other provisions” shall be identified and included in the Rules of Procedure.

[7] Similar course of action as prescribed in footnote 7*bis* of § 6.21 of Article 6 of Appendix **30B** applies.

considered as being affected and receiving more interference than that produced by the supporting Appendix **30B** assignment(s) and whose agreement has not been provided under § 9.

13 The Bureau shall determine if the cumulative interference is caused to an allotment in the Plan or an assignment in the List or an assignment for which the Bureau has received complete information in accordance with Article 6 of Appendix **30B** before the date of receipt of the complete notice under § 9. The cumulative interference shall be calculated based on Appendix 1 to Annex 4 of Appendix **30B**, taking into account assignments in the Appendix **30B** ESIM List together with assignments submitted under § 9. The cumulative interference is considered as being caused when the overall aggregate $(C/I)_{aggregate}$ value is less than that resulting from the supporting Appendix **30B** assignment(s) with a tolerance of 0.25 dB (inclusive of the 0.05 dB computational precision), except for an allotment in the Plan, an assignment stemming from the conversion of an allotment into an assignment without modification, or when the modification is within the envelope characteristics of the initial allotment, as well as assignments relating to application of Article 7 of Appendix **30B** for which the 0.05 dB computational precision is applicable.

14 In the event of a favourable finding under §§ 12 and 13, the Bureau shall enter the proposed assignment in the Appendix **30B** ESIM List and publish in a Special Section of its BR IFIC the characteristics of the assignment received under § 9, together with the names of administrations with which the provisions of this procedure have been successfully applied.

15 When the examination under § 12 or § 13 leads to an unfavourable finding with respect to allotments in the Plan, conversion of an allotment into an assignment for national coverage, Article 7 request transferred to Article 6, or submission in accordance with Resolution **170 (WRC-19)**, the Bureau shall return the notice to the notifying administration. In this case, the notifying administration undertakes not to bring into use the frequency assignments until the finding with respect to allotments in the Plan, conversion of an allotment into an assignment for national coverage, Article 7 request transferred to Article 6, or submission in accordance with Resolution **170 (WRC-19)**, is favourable. The Bureau, in returning the notice to the notifying administration, shall indicate that the subsequent resubmission under § 9 will be considered with a new date of receipt.

15*bis* When the examination under § 12 or § 13 leads to a favourable finding with respect to allotments in the Plan, conversion of an allotment into an assignment for national coverage, Article 7 request transferred to Article 6, submission in accordance with Resolution **170 (WRC-19)**, but an unfavourable finding with respect to others, and if the notifying administration insists that the proposed assignment be included in the Appendix **30B** ESIM List, the Bureau shall enter the assignment provisionally in the Appendix **30B** ESIM List with an indication of those administrations whose assignments were the basis of the unfavourable finding. To this effect, the notifying administration shall include a signed commitment, indicating that use of an assignment provisionally recorded in the Appendix **30B** ESIM List shall not cause unacceptable interference to, nor claim protection from, those assignments for which agreement still needs to be obtained. The entry in the Appendix **30B** ESIM List shall be changed from provisional to definitive only if the Bureau is informed that all required agreements have been obtained.

15*ter* Should the assignments that were the basis of the unfavourable finding not be brought into use within the period specified in § 6.1 of Article 6 of Appendix **30B** or within the extension period under § 6.31*bis* Article 6 of Appendix **30B**, then the status of the assignment in the Appendix **30B** ESIM List shall be reviewed accordingly.

16 Should unacceptable interference be caused by an assignment entered in the Appendix **30B** ESIM List under § 15*bis* to any assignment in the List which was the basis of the disagreement, the notifying administration of the assignment entered in the Appendix **30B** ESIM List under § 15*bis* shall, upon receipt of advice thereof, immediately eliminate this unacceptable interference.

17 For the examinations referred to in Part I and Part II, the Bureau shall generate a set of uplink grid points inside the service area of the relevant assignments to A-ESIMs and M-ESIMs, assuming that A-ESIMs and M-ESIMs are located at these uplink grid points.

Section B – Procedure for notification and recording in the Master Register of assignments to earth stations on board aircraft and vessels dealt with under this Resolution

1 Any assignment for which the relevant procedure of Section A and Part II of this Annex has been successfully applied shall be notified to the Bureau using the relevant characteristics listed in Appendix **4**, not earlier than three years before the assignments are brought into use.

2 If the first notice referred to in § 1 has not been received by the Bureau within the required period mentioned in § 1 of Section A, the assignments in the Appendix **30B** ESIM List shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period.

3 Notices not containing those characteristics specified in Appendix **4** as mandatory or required shall be returned with comments to help the notifying administration to complete and resubmit them, unless the information not provided is immediately forthcoming in response to an inquiry by the Bureau.

4 Complete notices shall be marked by the Bureau with their date of receipt and shall be examined in the date order of their receipt. Following receipt of a complete notice, the Bureau shall, as soon as possible after the date of entry of the corresponding assignment into the Appendix **30B** ESIM List or within not more than two months if the corresponding assignment has already been entered into the Appendix **30B** ESIM List, publish its contents, with any diagrams and maps and the date of receipt, in the BR IFIC, which shall constitute the acknowledgement to the notifying administration of receipt of its notice. When the Bureau is not in a position to comply with the time-limit referred to above, it shall periodically so inform the administrations, giving the reasons thereof.

5 The Bureau shall not postpone the formulation of a finding on a complete notice unless it lacks sufficient data to reach a conclusion thereon.

6 Each notice shall be examined:

6.1 with respect to its conformity with the Table of Frequency Allocations and the other provisions[8] of these Regulations, except those provisions relating to conformity with the FSS Plan and the procedures for obtaining coordination, which are the subject of the following subparagraph;

6.2 with respect to its conformity with the FSS Plan, the procedures for obtaining coordination and the associated provisions[9].

7 When the examination with respect to § 6.1 leads to a favourable finding, the assignment shall be examined further with respect to § 6.2; otherwise, the notice shall be returned with an indication of the appropriate action.

8 When the examination with respect to § 6.2 leads to a favourable finding, the assignment shall be recorded in the Master Register. When the finding is unfavourable, the notice shall be returned to the notifying administration, with an indication of the appropriate action.

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[8] The "other provisions" shall be identified and included in the Rules of Procedure.

[9] When an administration notifies any assignment with characteristics different from those entered in the Appendix **30B** ESIM List through successful application of the relevant procedure of Section A and Part II of this Annex, the Bureau shall undertake calculation to determine if the proposed new characteristics increase the interference level caused to other allotments in the Plan, assignments in the List, an assignment for which the Bureau has received complete information in accordance with § 6.1 of Article 6 of Appendix **30B** before the date of receipt of this notification, assignments in the Appendix **30B** ESIM List and an assignment for which the Bureau has received complete information in accordance with § 1 of Section A before the date of receipt of this notification. The increase of the interference due to characteristics different from those entered in the Appendix **30B** ESIM List will be checked by comparing the *C*/*I* ratios of these other allotments and assignments, which result from the use of the proposed new characteristics of the subject assignment on the one hand, and those obtained with the characteristics of the subject assignment in the Appendix **30B** ESIM List, on the other hand. This *C*/*I* calculation is performed under the same technical assumptions and conditions.

9 In every case when a new assignment is recorded in the Master Register it shall, in accordance with the provisions of this Resolution, include an indication of the finding reflecting the status of the assignment. This information shall also be published in the BR IFIC.

10 A notice of a change in the characteristics of an assignment already recorded, as specified in Appendix **4**, shall be examined by the Bureau under § 6.1 and § 6.2, as appropriate. Any changes to the characteristics of an assignment that has been recorded and confirmed as having been brought into use shall be brought into use within eight years from the date of the notification of the modification. Any changes to the characteristics of an assignment that has been recorded but not yet brought into use shall be brought into use within the period provided for in § 1 of Section A.

11 In applying the provisions of this Section, any resubmitted notice which is received by the Bureau more than six months after the date on which the original notice was returned by the Bureau shall be considered to be a new notice.

12 All frequency assignments notified in advance of their being brought into use shall be entered provisionally in the Master Register. Any frequency assignment provisionally recorded under this provision shall be brought into use no later than the end of the period provided for in § 1 of Section A. Unless the Bureau has been informed by the notifying administration of the bringing into use of the assignment, it shall, no later than 15 days before the end of the regulatory period established under § 1 of Section A, send a reminder requesting confirmation that the assignment has been brought into use within the regulatory period. If the Bureau does not receive that confirmation within 30 days following the period provided under § 1 of Section A, it shall cancel the entry in the Master Register and the corresponding assignment in the Appendix **30B** ESIM List.

13 When the Bureau has received confirmation that the assignment in the Appendix **30B** ESIM List has been brought into use, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC.

14 Wherever the use of a frequency assignment in the Appendix **30B** ESIM List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When that assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the assignment is brought back into use shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled from the Master Register and the Appendix **30B** ESIM List.

15 If the supporting Appendix **30B** assignment(s) is cancelled from the List, the corresponding ESIM assignment shall also be cancelled from the Appendix **30B** ESIM List and the Master Register, as appropriate.

PART II

Procedure to be followed by the administrations and the Bureau for examination and protection of one ESIM with respect to the other ESIMs

1 In the publication of the Special Section referred to in § 5 of Section A, the Bureau shall also include the names of the affected administrations, the corresponding assignments in the Appendix **30B** ESIM List and assignments for which the Bureau has previously received complete information in accordance with § 1 of Section A and which it has examined under § 4 of Section A, as appropriate.

2 In determining administrations whose assignments in the Appendix **30B** ESIM List or assignments for which the Bureau has previously received complete information in accordance with § 1 of Section A and which it has examined under § 4 of Section A are considered as being affected, the Bureau shall apply the principle of Annex 4 to Appendix **30B** and the following criteria:

a) orbital spacing as specified in paragraph 1.2 of Annex 4;

b) Earth-to-space single-entry carrier-to-interference as specified in paragraph 2.1 of Annex 4 or Earth-to-space single-entry carrier-to-interference (C/I) derived from the supporting Appendix **30B** assignment(s), whichever is the lowest;

c) the Earth-to-space pfd as specified in paragraph 2.2 of Annex 4.

3 An administration that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the BR IFIC referred to in § 5 of Section A shall be deemed to have agreed to the proposed assignment. This time-limit shall be extended for an administration that has requested the assistance of the Bureau by up to thirty days following the date on which the Bureau communicated the result of its action.

4 Unless coordination is no longer required, taking into account the final characteristics of the notice in § 9 of Section A, should harmful interference be caused by an assignment included in Appendix **30B** ESIM List to any assignment in Appendix **30B** ESIM List identified in § 1 for which agreement has not been obtained, the notifying administration shall, upon receipt of advice thereof, immediately eliminate this harmful interference.

ANNEX 2 TO DRAFT NEW RESOLUTION [A115] (WRC-23)

Provisions for earth stations on aircraft and vessels to protect terrestrial services in the frequency band 12.75-13.25 GHz

The parts below contain provisions to ensure that A-ESIMs and M-ESIMs do not cause unacceptable interference in neighbouring countries to terrestrial service operations when earth stations operate in frequency bands overlapping with those used at any time by terrestrial services to which the frequency band 12.75-13.25 GHz is allocated and operating in accordance with the Radio Regulations (see also *resolves* 1.2 of this Resolution).

PART I

Earth stations on vessels

1 The notifying administration of the GSO FSS network with which an M-ESIM communicates shall ensure compliance of the M-ESIM operating within the frequency band 12.75-13.25 GHz, or parts thereof, with both of the following conditions for the protection of terrestrial services to which the frequency band is allocated within a coastal State:

1.1 The minimum distance from the low-water mark as officially recognized by the coastal State beyond which an M-ESIM can operate without the prior agreement of any administration is 133 km in the frequency band 12.75-13.25 GHz. Any transmissions from an M-ESIM within the minimum distance shall be subject to the prior agreement of the coastal State concerned.

1.2 The maximum earth station on vessel e.i.r.p. spectral density towards the horizon shall be limited to 12.5 dB(W/MHz). Transmissions from an M-ESIM with higher e.i.r.p. spectral density levels towards the territory of any coastal State shall be subject to the prior agreement of the coastal State concerned.

PART II

Earth stations on aircraft

2 The notifying administration of the GSO FSS satellite network with which an A-ESIM communicates shall ensure compliance of the A-ESIM operating within the frequency band 12.75-13.25 GHz, or parts thereof, with all of the following conditions for the protection of terrestrial services to which the frequency band is allocated:

PFD MASK

1 When within line-of-sight of the territory of an administration, and above an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single A-ESIM shall not exceed:

$pfd(\theta) = -112$	$(dB(W/(m^2 \cdot 14\ MHz)))$	for	$\theta \leq 5°$
$pfd(\theta) = -117 + \theta$	$(dB(W/(m^2 \cdot 14\ MHz)))$	for	$5 < \theta \leq 40°$
$pfd(\theta) = -77$	$(dB(W/(m^2 \cdot 14\ MHz))$	for	$40 < \theta \leq 90°$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

2 When within line-of-sight of the territory of an administration, and up to an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single A-ESIM shall not exceed:

$pfd(\theta) = -123.5$	$dB(W/(m^2 \cdot MHz))$	for	$\theta \leq 5°$
$pfd(\theta) = -128.5 + \theta$	$dB(W/(m^2 \cdot MHz))$	for	$5 < \theta \leq 40°$
$pfd(\theta) = -88.5$	$dB(W/(m^2 \cdot MHz))$	for	$40 < \theta \leq 90°$

where θ is the angle of arrival of the radio frequency wave (degrees above the horizon).

ANNEX 3 TO DRAFT NEW RESOLUTION [A115] (WRC-23)

Provisions for earth stations on aircraft and vessels to protect non-GSO FSS in the frequency band 12.75-13.25 GHz

1 In order to protect the non-GSO FSS systems referred to in *resolves* 1.1.5 of this Resolution in the frequency band 12.75-13.25 GHz, ESIMs shall comply with the following operational limitations[20]:

a) the on-axis e.i.r.p. density emitted by an ESIM in a GSO network in the frequency band 12.75-13.25 GHz which operates with an antenna maximum gain lower than 38.5 dBi, is not to exceed 49 dB(W/1 MHz);

b) the on-axis e.i.r.p. density emitted by an ESIM in a GSO network in the frequency band 12.75-13.25 GHz which operates with an antenna maximum gain equal to or greater than 38.5 dBi but lower than 45 dBi, is not to exceed 54 dB(W/1 MHz);

c) the on-axis e.i.r.p. density emitted by an ESIM in a GSO network in the frequency band 12.75-13.25 GHz which operates with an antenna maximum gain equal to or greater than 45 dBi, is not to exceed 57.5 dB(W/1 MHz);

d) the level of e.i.r.p. density emitted by an ESIM in a GSO network in the frequency band 12.75-13.25 GHz is not to exceed the following values for any off-axis angle which is 3° or more off the main-lobe axis of an ESIM antenna and outside 3° of the GSO arc:

Off-axis angle	*Maximum e.i.r.p. density*
3 □ □ □ □ 31.6°	37 − 25 log □ dB(W/40 kHz)
31.6 □ □ □ □ 180 □	−0.5 dB(W/40 kHz)

ANNEX 4 TO DRAFT NEW RESOLUTION [A115] (WRC-23)

Methodology with respect to the examination of compliance of A-ESIM with pfd limits in Part II of Annex 2

Note: further modifications to this Annex maybe necessary depending on the outcome of Res 169 discussion

1 Overview of the methodology

An A-ESIM can operate at different locations defined by latitude, longitude and altitude. This methodology determines the maximum allowable off-axis e.i.r.p. spectral density ("**EIRP$_C$**") for an A-ESIM transmitter communicating with a GSO FSS satellite and still ensure compliance with the pfd limits

[20] Compliance of these limitations will not be examined by the Bureau.

included in Part II of Annex 2 to Resolution [A115] to protect terrestrial services, for a defined set of altitude ranges. The methodology derives the **EIRP$_C$** taking into account the relevant loss and attenuation in the geometry considered.

The methodology then compares the computed **EIRP$_C$** with the Reference A-ESIM off-axis e.i.r.p. towards the ground ("**EIRP$_R$**") under which the A-ESIM operates. The **EIRP$_R$** of the GSO satellite network is calculated from the data included in the Appendix 4 Notification information of GSO satellite network with which the ESIM communicates and on the ESIM characteristics, as applicable. For the emission in each group of a GSO satellite system, **EIRP$_R$** can be calculated by using the Appendix **4** data for that system as well as other input parameters that shall be provided by the notifying administration for that system.

The operations of A-ESIM may be evaluated over a number of predefined altitude ranges in order to establish a number of **EIRP$_C$** levels. Each altitude range would have its own **EIRP$_C$** such that, all other assumptions being equal, higher altitude A-ESIM operation would allow for a higher **EIRP$_C$**, since the distance between the A-ESIM and the chosen location on the ground is larger and so are the applicable losses and attenuations.
An examination by the Bureau should apply this methodology for each altitude range, to determine whether the A-ESIM operating under a given GSO satellite network would comply with the pfd limits included in Part II of Annex 2 to Resolution [A115] to protect terrestrial services.

2 Parameters and geometry

Considering a hypothetical GSO satellite network, Table 1 below describes the emissions that are examined and that are included in one Group associated to A-ESIM transmitting in the 12.75-13.25 GHz band. Tables 2 and 3 provide additional parameters.

TABLE 1

Example of a Group of applicable A-ESIM emissions (with reference to relevant RR Appendix 4 data fields)

Emission n.	C7a Designation of emission	$BW_{emission}$ MHz	C8a2 Maximum power density dB(W/Hz)
1	6M00G7W--	6.0	-66.0
2	6M00G7W--	6.0	-61.0
3	6M00G7W--	6.0	-56.0

TABLE 2

Additional example assumptions

ID	Parameter	Notation	Value	Unit
1	Frequency assignment	f	13	GHz
2	Reference bandwidth of pfd mask	BW_{Ref}	14.0	MHz
3	GSO satellite longitude	GSO_{lon}	13.0	deg E
4[1)]	GSO service area latitude bounds	GSO_srv_{Lat}	(23.55, 63.55)	deg N

ID	Parameter	Notation	Value	Unit
5[1)]	GSO service area longitude bounds	GSO_srv_{Lon}	(-9.72, 30.28)	deg E
6	A-ESIM antenna peak gain	G_{max}	36	dBi
7	A-ESIM antenna gain pattern	-	As per Recommendation ITU-R S.580 (see C.10.d.5.a.1)	

TABLE 3

Additional assumptions defined in the methodology

ID	Parameter	Notation	Value	Unit
8[1)]	Polarisation loss	L_{Pol}	0.0	
9[2)]	Atmospheric attenuation	L_{atm}	Computed with Rec. ITU-R P.676	dB
10	Angle of arrival of the incident wave on the Earth's surface	δ	Specified by the pre-established sets of PFD limits, variable from 0° to 90°	deg
11	Minimum examination altitude	H_{min}	0.01	km
12	Maximum examination altitude	H_{max}	15.0	km
13	Examination altitude spacing	H_{step}	1.0	km
14	Fuselage attenuation	L_f	Computed with Rep. ITU-R M.2221 (Table 4), other ITU-R Reports or Recommendation or based upon modelling results using numerical methods or a measurement campaign	dB

Notes:

1) No additional loss figure for polarization discrimination is considered in element 8 because both isolation factor Att and Fuselage Attenuation factor are considering angles so far off the defined Main Beam axis that the antenna's polarization could not be maintained, and the polarization discrimination factor would be unknown or may be captured by other factors.

The fourth spacing is Table 7 below is slightly adjusted to 2.99 km in order set integer value of 3 km altitude.

FIGURE 1

Geometry for the examination of compliance for two different ESIM altitudes

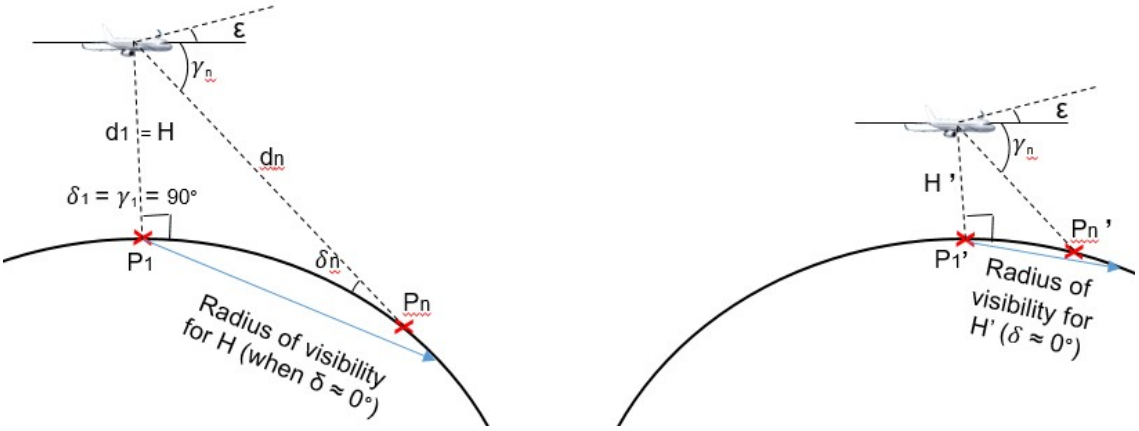


FIGURE 2

A-ESIM Main Beam Gain points at satellite

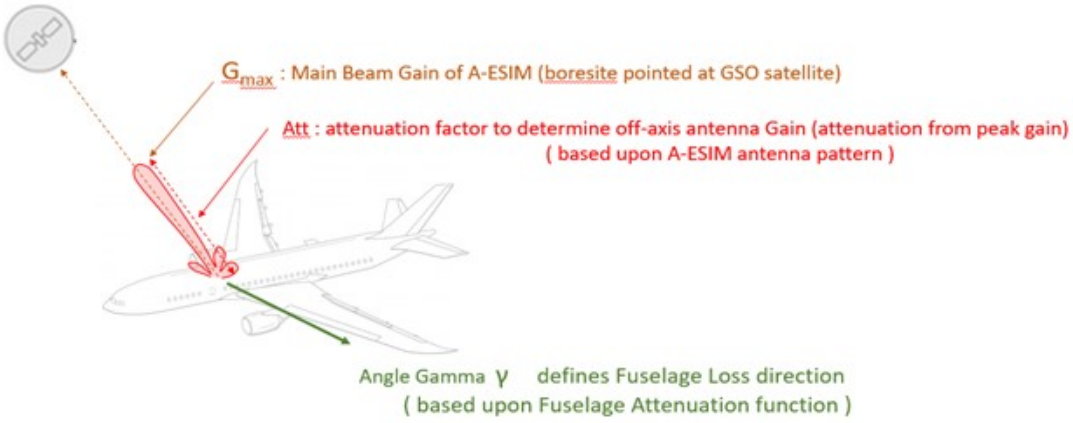


TABLE 4

Fuselage Attenuation Model

$L_{fuse}(\gamma) = 3.5 + 0.25 \cdot \gamma$	dB	for	$0° \leq \gamma \leq 10°$
$L_{fuse}(\gamma) = -2 + 0.79 \cdot \gamma$	dB	for	$10° < \gamma \leq 34°$
$L_{fuse}(\gamma) = 3.75 + 0.625 \cdot \gamma$	dB	for	$34° < \gamma \leq 50°$
$L_{fuse}(\gamma) = 35$	dB	for	$50° < \gamma \leq 90°$

Notes:

- This example fuselage attenuation model from on Rep. ITU-R M.2221-0.

Tables 5A and 5B are taken from Part II of Annex 2 of Resolution **[A115]**. The reference bandwidth for the sets of pfd limits included in Table 5A and 5B are 1 MHz and 14 MHz, respectively.

$pfd(\theta) = -112$	$(dB(W/(m^2 \cdot 14\ MHz)))$	for	$\theta \leq 5°$
$pfd(\theta) = -117 + \theta$	$(dB(W/(m^2 \cdot 14\ MHz)))$	for	$5 < \theta \leq 40°$
$pfd(\theta) = -77$	$(dB(W/(m^2 \cdot 14\ MHz))$	for	$40 < \theta \leq 90°$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

2 When within line-of-sight of the territory of an administration, and up to an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single A-ESIM shall not exceed:

$pfd(\theta) = -123.5$	$dB(W/(m^2 \cdot MHz))$	for	$\theta \leq 5°$
$pfd(\theta) = -128.5 + \theta$	$dB(W/(m^2 \cdot MHz))$	for	$5 < \theta \leq 40°$
$pfd(\theta) = -88.5$	$dB(W/(m^2 \cdot MHz))$	for	$40 < \theta \leq 90°$

where θ is the angle of arrival of the radio frequency wave (degrees above the horizon).

TABLE 5A

Required conformance pfd mask for altitudes up to 3 km

$pfd(\theta) = -123.5$	$dB(W/(m^2 \cdot MHz))$	for	$\theta \leq 5°$
$pfd(\theta) = -128.5 + \theta$	$dB(W/(m^2 \cdot MHz))$	for	$5 < \theta \leq 40°$
$pfd(\theta) = -88.5$	$dB(W/(m^2 \cdot MHz))$	for	$40 < \theta \leq 90°$

TABLE 5B

Required conformance pfd mask for altitudes above 3 km

$pfd(\theta) = -112$	$(dB(W/(m^2 \cdot 14\ MHz)))$	for	$\theta \leq 5°$
$pfd(\theta) = -117 + \theta$	$(dB(W/(m^2 \cdot 14\ MHz)))$	for	$5 < \theta \leq 40°$
$pfd(\theta) = -77$	$(dB(W/(m^2 \cdot 14\ MHz))$	for	$40 < \theta \leq 90°$

3 Step-by-step algorithm

This section includes a step-to-step description of how the examination methodology would be implemented.

START

i) For each of the emissions included in the Group under consideration, compute the reference e.i.r.p. ($EIRP_R$, dB(W)) as:

$$EIRP_R = G_{Max} - G_{Isol_{Max}} + P_{Max} + 10\log_{10}(BW) \quad (1)$$

where:

G_{max} is the A-ESIM antenna peak gain in dBi

G_{Isol_Max} is the maximum achievable gain isolation of the A-ESIM antenna towards the ground in dB, taking into account the pointing of the A-ESIM towards the GSO satellite within the GSO network service area

P_{max} is the maximum power density at the A-ESIM antenna flange in dB(W/Hz).

BW in Hz is:

$$BW_{Ref} \text{ if } BW_{emission} > BW_{Ref}$$

$$BW_{emission} \text{ if } BW_{emission} < BW_{Ref}$$

ii) For each aircraft altitude, it is necessary to generate as many δ_n angles (angle of arrival of the incident wave) as required in order to test the full compliance with the applicable set of pfd limits. The N angles δ_n must be comprised between 0° and 90° and have a resolution compatible with the granularity of the pre-established pfd limits. Each of the angles δ_n will correspond to as many N points on the ground.

iii) For each altitude $H_j = H_{min}, H_{min} + H_{step}, \ldots, H_{max}$, compute $EIRP_{C\_j}$ using the following algorithm:

a) set the altitude of the *A_ESIM* to H_j

b) compute the angle below the horizon $\gamma_{j,n}$ as seen from the A-ESIM for each of the N angles δ_n generated in ii. using the following equation:

$$\gamma_{j,n} = \arccos\left(\frac{R_e \cdot \cos(\delta_n)}{(R_e + H_j)}\right) \quad (2)$$

where R_e is the mean earth radius.

c) Compute the distance $D_{j,n}$, in km, for $n = 1, \ldots, N$ between the A-ESIM and the tested point on the ground:

$$D_{j,n} = \sqrt{R_e^2 + (R_e + H_j)^2 - 2\,R_e\,(R_e + H_j)\cos(\gamma_n - \delta_n)} \quad (3)$$

d) Compute the fuselage attenuation $L_{f\,j,n}$ (dB) with $i = 1, \ldots, N$ applicable to each of the of the angles $\gamma_{j,n}$ computed in b). above.

e) Compute the gaseous absorption $L_{atm\_j,n}$ (dB) with $i = 1, \ldots, N$ applicable to each of the distances $D_{j,n}$ computed in c) above, using the applicable sections of Recommendation ITU-R P.676.

f) Compute the maximum $EIRP_{C\_j,n}$ (dB(W/BW_{Ref})) that is the maximum e.i.r.p. that can be radiated by the A-ESIM at altitude H_j towards each of the angles $\gamma_{j,n}$ and still be compliant with the pfd limits indicated in Table 5, as per the following equation:

$$EIRP_{C\ j,n}(\delta_n, \gamma_n) = pfd(\delta_n) + 10\log_{10}\left(4\pi(D_{j,n} \cdot 1000)^2\right) + L_{f\ j,n} + L_{atm\ j,n} \quad (4)$$

g) Compute the minimum $EIRP_{C\_j}$ across all values calculated at the previous step, $EIRP_{C\_j} = \text{Min}\ (EIRP_{C\_j,n}\ (\delta_n, \gamma_n))$.. The output of this step is the maximum $EIRP_{C\_j}$ that can be safely radiated by the A-ESIM to ensure it complies with the PFD limits indicated in Table 5A or 5B, as applicable, with respect to all angles δ_n at the altitude H_j. There will be one $EIRP_{C\_j}$ for each of the H_j altitudes considered.

The output of step g) is summarised in Table 7 below:

TABLE 7

Computed $EIRP_{C\_j}$ values

H_j (km)	$EIRP_{C\_j}$ dB(W/BW$_{Ref}$)
0.01	*TBD*
1.0	*TBD*
2.0	*TBD*
3.0	*TBD*
4.0	*TBD*
5.0	*TBD*
6.0	*TBD*
7.0	*TBD*
8.0	*TBD*
9.0	*TBD*
10.0	*TBD*
11.0	*TBD*
12.0	*TBD*
13.0	*TBD*
14.0	*TBD*
15.0	*TBD*

Note:

This methodology computes the e.i.r.p. backwards, upwards from the ground, starting with the power flux-density (pfd, either the one specified in Table 5A or 5B, depending on the altitude H_j, as applicable) and:

- converting it to an effective received power at the ground;
- translating back to the aircraft location based upon the slant distance and subtracting propagation losses based upon distance;
- computing and subtracting atmospheric losses based upon distance;
- computing and subtracting fuselage attenuation losses based upon the angle below the aircraft local horizon.

All to allow the A-ESIM operator to operate in compliance with an effective on-axis boresight isotropic radiated power (e.i.r.p.) that would ensure it complies with the pfd mask at the airborne A-ESIM altitude and location considered.

iii) For each of the groups, check whether there is at least one j) for which $EIRP_{C\_j} >$ $EIRP_R$. The results of this check are illustrated in Table 8 below.

TABLE 8

Comparison between $EIRP_{C\_j}$ and $EIRP_R$

Group n.	C7a Designation of emission	$EIRP_R$ dB(W/BW$_{Ref}$)	Lowest altitude H_j (km) for which $EIRP_{C\_j} > EIRP_R$
1	6M00G7W--	TBD	TBD
2	6M00G7W--	TBD	TBD
3	6M00G7W--	TBD	TBD

For the emissions included in the Group under examination which pass the test detailed in iv. above, the results of the Bureau's examination for that Group is ***favorable****, after removing emissions that have failed the examination*, otherwise it is ***unfavorable***.

v) The Bureau should publish:

a) The finding (favorable or unfavorable) for the examined Group of the GSO system examined; and

b) the information included in Table 8, along with the comment: The operation of A-ESIM with the Emission **XXX** (Emission Code) under examination shall be possible below the altitude of **YYY** km (minimum altitude for favourable finding of that emission) referred to in Table 8 only if the appropriate mitigation techniques are used to ensure that the power flux-density produced on Earth's surface respect the limits indicated in Part II of Annex 3 to Resolution **169 (WRC-19)** on territories where those limits apply.

Note:

- *As part of standard procedure, the Bureau would publish the emissions with unfavorable finding in BR IFIC Part III-S, which concerns frequency assignments that are returned to the responsible administration.*

SUP USA/1.15/4

RESOLUTION 172 (WRC-19)

Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space)

Reasons: Consequential deletion.

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.16

*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)**;*

Background

ESIMs (earth stations in motion) under WRC-23 Agenda Item 1.16 are earth stations that communicate with non-geostationary (non-GSO) space stations in the fixed-satellite service (FSS) in the bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (all space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (all Earth-to-space), while operating on moving platforms. As a result, they are treated differently as they can introduce a different interference environment from earth stations which are of specific or typical fixed type operating within the fixed-satellite service.

In accordance with *resolves* 3 of Resolution **173 (WRC-19)**, sharing and compatibility studies considered only aeronautical and maritime ESIMs (land ESIMs were not studied), taking into account the need to ensure the protection of , and not impose undue constraints on, services allocated in the frequency bands.
.

ESIMs communicating with non-GSO space stations in 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) can be used to provide broadband communications to mobile platforms. The interference environment resulting from the operation of non-GSO aeronautical and maritime ESIMs has been studied in the ITU-R, and the following proposals reflect the technical, operational and regulatory provisions necessary to ensure the cross-border protection of incumbent services, including terrestrial services, from the operation of aeronautical and maritime ESIMs with non-GSO space stations in these frequency bands.

Proposals:

USA/1.16/1 MOD

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
…		
17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A ADD 5.A116 (Earth-to-space) 5.516 MOBILE	**17.7-17.8** FIXED FIXED-SATELLITE (space-to-Earth) 5.517 5.517A ADD 5.A116 (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.515	**17.7-18.1** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A ADD 5.A116 (Earth-to-space) 5.516 MOBILE
	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A ADD 5.A116 (Earth-to-space) 5.516 MOBILE 5.519	
18.1-18.4	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A ADD 5.A116 (Earth-to-space) 5.520 MOBILE 5.519 5.521	

MOD

18.4-22 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.4-18.6	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A ADD 5.A116 MOBILE	
…		
18.8-19.3	FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A ADD 5.A116 MOBILE	
…		
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A ADD 5.A116 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	
…		

Reasons: To modify the Table of Frequency Allocations in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz to add a footnote concerning the use of FSS space-to-Earth frequency bands for non-GSO space stations communicating with aeronautical and maritime ESIM.

USA/1.16/2 MOD

24.75-29.9 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
…		
27.5-28.5	FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 ADD 5.A116 MOBILE 5.538 5.540	

28.5-29.1	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 ADD 5.A116 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
…		
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

Reasons: To modify the Table of Frequency Allocations in the frequency bands 27.5-29.1 GHz and 29.5-29.9 GHz to add a footnote concerning the use of aeronautical and maritime ESIM communicating with non-GSO FSS space stations.

USA/1.16/3 MOD

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.9-30	FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 ADD 5.A116 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542	

Reasons: To modify the Table of Frequency Allocations in the frequency band and 29.9-30 GHz to add a footnote concerning the use of aeronautical and maritime ESIM communicating with non-GSO FSS space stations.

USA/1.16/4 ADD

5.A116 The operation of earth stations in motion communicating with non-geostationary fixed-satellite service space stations in the bands 17.7-18.6 GHz (space-to-Earth), 18.8-19.3 GHz (space-to-Earth) and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz (Earth-to-space) and 29.5-30 GHz (Earth-to-space) shall be subject to Resolution **[A116] (WRC-23)**.

Reasons: To add a new footnote enabling the use of aeronautical and maritime ESIM in the mentioned FSS bands communicating with non-GSO space stations subject to new WRC-23 draft Resolution **[A116] (WRC-23)**.

USA/1.16/5 ADD

RESOLUTION [A116] (WRC-23)

Use of 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) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is a need for global broadband mobile satellite communications, and that some of this need could be met by allowing earth stations in motion (ESIMs) to communicate with space stations of non-geostationary satellite orbit (non-GSO) fixed-satellite service (FSS) systems operating in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (all space-to-Earth) and 27.5-29.1 GHz and 29.5-30.0 GHz (all Earth-to-space);

b) that the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (all space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (all Earth-to-space) are allocated to space services; the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, and 27.5-29.1 GHz are allocated to terrestrial services on a primary basis worldwide; in the countries identified in No. **5.524** of the Radio Regulations, the band 19.7-20.2 GHz is allocated to the fixed and mobile services on a primary basis; and, in the countries identified in No. **5.542** of the Radio Regulations, the band 29.5-30 GHz is allocated to the fixed and mobile services on a secondary basis;

c) that the frequency bands in *considering* b) are used by a variety of different systems and these existing services and their future development need to be protected, without any undue constraints, from the operation of non-GSO ESIMs;

d) there is no specific regulatory procedure for the coordination of non-GSO ESIMs relative to terrestrial stations for these services;

e) that the frequency band 18.6-18.8 GHz is allocated to earth exploration-satellite service (EESS) (passive) and the space research service (SRS) (passive) and that these services need to be protected from operation of non-GSO FSS space-to-Earth links towards ESIMs;

f) that the ITU Radiocommunication Sector (ITU-R) has studied the technical and operational requirements for aeronautical and maritime earth stations in motion communicating with non-GSO FSS systems in the frequency bands 17.3-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz (all space-to-Earth), and 27-29.1 GHz and 29.5-30 GHz (all Earth-to-space);

g) that appropriate regulatory and interference-management mechanisms, including necessary mitigation measures, are required for the operation of non-GSO ESIMs to protect other space and terrestrial services that are allocated on a primary basis in the Radio Regulations in the frequency bands mentioned in *considering a)*,

considering further

a) that administrations intending to authorize non-GSO ESIMs, when establishing national licensing rules, may consider adopting other interference management procedures and/or mitigation measures than those contained in this Resolution as long as the provisions in Annex 1 are unchanged in cross-border applications;

b) that it is important to identify the responsibilities of the entities involved in the operation of aeronautical and maritime non-GSO ESIMs;

c) that aeronautical and maritime ESIMs operating within the service area of the FSS systems with which they communicate may provide service within the territories under the jurisdiction of multiple administrations/countries;

d) that the operation of an ESIM within the territory under the jurisdiction of administration/countries mentioned in *considering further a)* above is subject to obtaining authorization from that administration/country;

e) that this Resolution does not establish any technical or regulatory provisions for the operation and use of land ESIMs communicating with non-GSO FSS space stations; and any authorization of land ESIMs remains strictly a national matter in the frequency bands subject to this resolution;

recognizing

a) that the administration authorizing non-GSO ESIMs on the territory under its jurisdiction has the right to require that non-GSO ESIMs referred to above only use those assignments associated with non-GSO FSS systems which have been successfully coordinated, notified, brought into use and recorded in the MIFR with a favourable finding under Articles **9** and **11**, including Nos. **11.31**, **11.32** or **11.32A**, where applicable;

b) that for cases of incomplete coordination under No. **9.7B** of the non-GSO FSS system with which non-GSO ESIMs communicate, the operation of non-GSO ESIMs in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth) needs to be in accordance with the provisions of No. **11.42** with respect to any recorded frequency assignment which was the basis of the unfavourable finding under No. **11.38**;

c) that No. **22.2** applies for the protection of geostationary-satellite networks in the fixed-satellite service (GSO FSS) and the broadcasting-satellite service (GSO BSS) operating in the frequency band 17.7-17.8 GHz from unacceptable interference caused by non-GSO ESIMs;

d) that under the provisions of No. **22.2**, non-GSO ESIMs in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz, shall not claim protection from GSO FSS and GSO BSS networks operating in accordance with these Regulations, and non-GSO ESIMs in the frequency bands 27.5-28.6 GHz and 29.5-30 GHz shall not cause unacceptable interference to GSO FSS and GSO BSS networks operating in accordance with these Regulations. No. **5.43A** does not apply in these cases;

e) that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments of the non-GSO FSS satellite system with which non-GSO ESIMs communicate or on the coordination requirements of that satellite system;

f) that successful compliance with this Resolution does not oblige any administration to authorize/license any non-GSO ESIM to operate within the territory under its jurisdiction (*see resolves* 3);

g) that a non-GSO FSS system operating in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-28.6 GHz and 29.5-30 GHz (Earth-to-space) in compliance with the epfd limits referred to in Nos. **22.5C**, **22.5D** and **22.5F** is considered as having fulfilled its obligations under No. **22.2** with respect to any geostationary-satellite network;

h) that the use of the frequency bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) by GSO FSS networks is subject to Nos. **9.12A** and **9.13**, and No. **22.2** does not apply;

i) that for the use of 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 29.5-30.0 GHz (Earth-to-space) by non-geostationary fixed-satellite service systems, including those operating ESIMs, No. **9.12** applies,

recognizing further

a) that under *resolves* 1.1.3 of this Resolution, frequency assignments to ESIMs need to be notified to the Radiocommunication Bureau;

b) that for the operation of ESIMs, notification of any frequency assignment under Article **11** of the Radio Regulations shall only be made by one single administration;

c) that, an administration authorizing the operation of ESIMs within the territory under its jurisdiction may modify/withdraw that authorization at any time;

resolves

1 that, for any aeronautical and/or maritime ESIMs communicating with non-GSO FSS space stations referred to in this Resolution within 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), or parts thereof, the following conditions shall apply:

1.1 with respect to space services in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz (all space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (all Earth-to-space), and in their adjacent band 18.6-18.8 GHz, non-GSO ESIMs shall comply with the following conditions:

1.1.1 with respect to satellite networks or systems of other administrations, non-GSO ESIMs' characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO FSS system with which these ESIMs communicate;

1.1.1.1 for the implementation of *resolves* 1.1.1 above, the notifying administration for the non-GSO FSS system with which the non-GSO ESIMs communicate shall, in accordance with this Resolution, send to the Radiocommunication Bureau (BR) the relevant Appendix **4** notification information related to the characteristics of the non-GSO ESIMs intended to communicate with that non-GSO FSS system, together with the commitment that the operation shall be in conformity with the Radio Regulations, including this Resolution;

1.1.1.2 upon receipt of the notification information referred to in *resolves* 1.1.1.1 above, the Bureau shall examine it with respect to the provisions referred to in *resolves* 1.1.1 above, including the commitment referred to in *resolves* 1.1.1.1 above, and publish the result of such examination in the International Frequency Information Circular (BR IFIC);

1.1.2 the notifying administration of the non-GSO FSS system with which the ESIMs communicate shall ensure that the operation of ESIMs complies with the coordination agreements obtained for the frequency assignments of the typical earth station of this non-GSO FSS system obtained under the provisions of Article **9** of the Radio Regulations, taking into account *recognizing b)* above;

1.1.2bis notifying administrations of the non-GSO FSS system with which the ESIMs communicate shall ensure that non-GSO ESIMs comply with the epfd limits referred to in Nos. **22.5C**, **22.5D** and **22.5F** for the protection of GSO FSS networks operating in the frequency bands 17.8-18.6 GHz, 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz and 29.5-30 GHz (Earth-to-space);

1.1.3 non-GSO ESIMs shall not claim protection from broadcasting-satellite service feeder-link earth stations operating in accordance with the Radio Regulations in the frequency band 17.7-18.4 GHz;

1.1.4 with respect to EESS (passive) operating in the frequency band 18.6-18.8 GHz, certain non-GSO FSS system with an orbital apogee of less than 20 000 km operating in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz with which aeronautical and/or maritime ESIMs communicate and for which the complete notification information has been received by the Radiocommunication Bureau after 1 January 2025 shall comply with the provisions indicated in Annex 3 to this Resolution;

1.1.4.1 for the implementation of *resolves* 1.1.4 above, the notifying administration for the non-GSO FSS system with which the non-GSO ESIMs communicate shall send to the BR the relevant Appendix **4** notification information including the commitment that the operation shall be in conformity with *resolves* 1.1.4,

1.2 with respect to terrestrial services in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz, 27.5-29.1 GHz, and 29.5-30 GHz non-GSO ESIMs shall comply with the following conditions:

1.2.1 receiving non-GSO ESIMs in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz (*see* No. **5.524**) shall not claim protection from terrestrial services to which the frequency bands are allocated and that operate in accordance with the Radio Regulations;

1.2.2 transmitting non-GSO ESIMs in the frequency band 27.5-29.1 GHz shall not cause unacceptable interference to terrestrial services to which the frequency band is allocated and that operate in accordance with the Radio Regulations, and Annex 1 to this Resolution shall apply;

1.2.3 transmitting non-GSO ESIMs in the frequency band 29.5-30.0 GHz shall not adversely affect the operations of terrestrial services to which this frequency band is

allocated and that operate in accordance with the Radio Regulations, and limits in Annex 1 to this Resolution shall apply with respect to administrations mentioned in No. **5.542**;

1.2.4 the provisions in this Resolution, including Annex 1, set the conditions for the purpose of protecting terrestrial services from unacceptable interference from aeronautical and maritime non-GSO ESIM in neighbouring countries in accordance with the provisions included in *resolves* 1.2.2 above; however, the requirement not to cause unacceptable interference to, or claim protection from, terrestrial services to which the frequency band is allocated and operating in accordance with the Radio Regulations remains valid (see *resolves* 6);

1.2.5 the Bureau shall examine, in accordance with the provisions included in *resolves* 1.2.2 above and with the methodology in Annex 2, the characteristics of aeronautical non-GSO ESIM with respect to the conformity with the power flux-density limits specified in Part 2 of Annex 1 to this Resolution and publish the results of such examination in the BR IFIC;

2 that non-GSO ESIMs shall not be used or relied upon for safety-of-life applications;

3 that the operation of non-GSO ESIMs within the territory, including territorial waters and airspace of an administration, shall be carried out only if authorized by that administration;

4 that the notifying administrations of those non-GSO FSS systems with which non-GSO ESIMs in the frequency bands in *considering a)* above are intended to operate shall submit a commitment to the Bureau to immediately act to eliminate unacceptable interference or reduce interference to an acceptable level upon receiving a report of unacceptable interference (*see resolves 5*);

5 that the notifying administration of the non-GSO FSS system with which non-GSO ESIMs communicate shall ensure:

5.1 that all necessary measures are taken so that non-GSO ESIMs are subject to permanent monitoring and control by a network control and monitoring centre (NCMC) or equivalent facility in order to comply with the provisions in this Resolution, and are capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands from the NCMC or equivalent facility;

5.2 that measures, when required, are taken to limit the operation of non-GSO ESIMs in the territory, including territorial waters and territorial airspace, under the jurisdiction of the administrations authorizing non-GSO ESIMs;

5.3 that a permanent point of contact shall be designated and provided by the notifying administration of the non-GSO FSS satellite systems with which the above-mentioned non-GSO ESIMs communicate for the purpose of tracing any suspected cases of unacceptable interference from non-GSO ESIMs and to immediately respond to requests from the focal point of the authorizing administration;

6 that in case of unacceptable interference caused by any type of non-GSO ESIM(s):

6.1 the administration of the country in which the non-GSO ESIM(s) is authorized shall cooperate with an investigation on the matter and provide any required information on the operation of the ESIM(s) and a point of contact to provide such information;

6.2 the administration of the country in which the non-GSO ESIM(s) is authorized and the notifying administration of the non-GSO FSS system with which the aeronautical and maritime non-GSO ESIM(s) communicates shall, jointly or individually, as the case may be and to the extent of ability of the former

administration, upon receipt of a report of unacceptable interference, take required actions to eliminate or reduce unacceptable interference to an acceptable level;

7 that the application of this Resolution does not provide regulatory status to non-GSO ESIMs different from that derived from the non-GSO FSS system with which they communicate, taking into account the provisions referred to in this Resolution (see *recognizing b)* above);

resolves further

1 that frequency assignments to non-GSO ESIMs shall be notified by the notifying administration of the satellite system in the fixed-satellite service with which ESIMs communicate;

2 that, the notifying administration of the satellite system shall ensure that non-GSO ESIMs operate only in the territory under the jurisdiction of any administration/country from which an authorization has been obtained, taking into account *recognizing further* c) above;

3 that for the implementation of *resolves further* 2 above, the notifying administration of the non-GSO FSS system with which the non-GSO ESIMs communicate shall ensure that the ESIMs are designed and operated so as to cease transmission over the territory of any administration/country from which authorization has not been obtained;

4 that the authorization to non-GSO ESIMs to operate in the territory under the jurisdiction of an administration shall in no way release the notifying administration of the satellite system with which the non-GSO ESIMs communicate from the obligation to comply with the provisions included in this Resolution and those contained in the Radio Regulations;

5 that, should an administration authorizing aeronautical non-GSO ESIMs agree to pfd levels higher than the limits contained in Part 2 of Annex 1 to this Resolution within the territory under its jurisdiction, such agreement shall not affect other countries that are not party to that agreement,

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, when required;

2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution, including whether or not the responsibilities relating to the operation of aeronautical and maritime non-GSO ESIM have been properly addressed;

3 not to examine, under No. **11.31**, the conformity of non-GSO FSS systems with the provisions of *resolves* 1.1.4 of this Resolution;

invites administrations

to collaborate for the implementation of this Resolution, in particular for resolving interference, if any,

instructs the Secretary-General

to bring this Resolution to the attention of the Secretary-General of the International Maritime Organization and of the Secretary General of the International Civil Aviation Organization.

ANNEX 1 TO DRAFT NEW RESOLUTION [A116] (WRC-23)

Provisions for maritime and aeronautical non-GSO ESIMs to protect terrestrial services operating in the frequency band 27.5-29.1 GHz, and for the frequency band 29.5-30.0 GHz on the territories of administrations mentioned in No. 5.542 (see No. 5.542)

The parts below contain provisions to ensure that maritime and aeronautical non-GSO ESIMs do not cause unacceptable interference in neighbouring countries to terrestrial service operations when non-GSO ESIMs operate in frequencies overlapping with those used by terrestrial services at any time to which the frequency band 27.5-29.1 GHz is allocated and that operate in accordance with the Radio Regulations. The provisions in the parts below could also be used as guidance to prevent the operation of the non-GSO ESIMs in the frequency band 29.5-30 GHz from adversely impacting the secondary terrestrial services operating pursuant to No. **5.542** of the Radio Regulations.

PART 1: MARITIME NON-GSO ESIMS

1 The notifying administration of the non-GSO FSS system with which a maritime non-GSO ESIMs communicate shall ensure compliance of the maritime non-GSO ESIMs operating within the frequency band 27.5-29.1 GHz or parts thereof, with both of the following conditions for the protection of terrestrial services to which the frequency band is allocated within a coastal State:

1.1 The minimum distance from the low-water mark as officially recognized by the coastal State beyond which maritime non-GSO ESIMs can operate without the prior agreement of any administration is 70 km. Any transmissions from maritime ESIM within the minimum distance shall be subject to the prior agreement of the coastal State(s) concerned.

1.2 The maximum maritime non-GSO ESIM e.i.r.p. spectral density towards the territory of any coastal State will be limited to 12.98 dBW in a reference bandwidth of 1 MHz or 24.44 dBW in a reference bandwidth of 14 MHz. Transmissions from maritime non-GSO ESIMs with higher e.i.r.p. spectral density levels towards the territory of any coastal state shall be subject to the prior agreement of the coastal State(s) concerned.

PART 2: AERONAUTICAL NON-GSO ESIMS

2 The notifying administration of the non-GSO FSS satellite system with which aeronautical ESIMs communicate shall ensure compliance of the aeronautical ESIMs operating within the frequency bands 27.5-29.1 GHz, or parts thereof, with all of the following conditions for the protection of terrestrial services to which the frequency band is allocated:

2.1 When within line-of-sight of the territory of an administration, and above an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single aeronautical non-GSO ESIMs shall not exceed:

$$pfd(\theta) = -124.7 \quad (dB(W/(m^2 \cdot 14\ MHz))) \quad for \quad 0° \le \theta \le 0.01°$$
$$pfd(\theta) = -120.9 + 1.9 \cdot \log\theta \quad (dB(W/(m^2 \cdot 14\ MHz))) \quad for \quad 0.01° < \theta \le 0.3°$$
$$pfd(\theta) = -116.2 + 11 \cdot \log\theta \quad (dB(W/(m^2 \cdot 14\ MHz))) \quad for \quad 0.3° < \theta \le 1°$$
$$pfd(\theta) = -116.2 + 18 \cdot \log\theta \quad (dB(W/(m^2 \cdot 14\ MHz))) \quad for \quad 1° < \theta \le 2°$$
$$pfd(\theta) = -117.9 + 23.7 \cdot \log\theta \quad (dB(W/(m^2 \cdot 14\ MHz))) \quad for \quad 2° < \theta \le 8°$$
$$pfd(\theta) = -96.5 \quad (dB(W/(m^2 \cdot 14\ MHz))) \quad for \quad 8° < \theta \le 90.0°$$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

2.2 When within line-of-sight of the territory of an administration, and up to an altitude of 3 km, the maximum pfd produced at the surface of the Earth on the territory of an administration by emissions from a single aeronautical ESIM shall not exceed:

$$pfd(\theta) = -136.2 \quad (dB(W/(m^2 \cdot 1\ MHz))) \quad for \quad 0° \le \theta \le 0.01°$$
$$pfd(\theta) = -132.4 + 1.9 \cdot \log\theta \quad (dB(W/(m^2 \cdot 1\ MHz))) \quad for \quad 0.01° < \theta \le 0.3°$$
$$pfd(\theta) = -127.7 + 11 \cdot \log\theta \quad (dB(W/(m^2 \cdot 1\ MHz))) \quad for \quad 0.3° < \theta \le 1°$$
$$pfd(\theta) = -127.7 + 18 \cdot \log\theta \quad (dB(W/(m^2 \cdot 1\ MHz))) \quad for \quad 1° < \theta \le 12.4°$$
$$pfd(\theta) = -108 \quad (dB(W/(m^2 \cdot 1\ MHz))) \quad for \quad 12.4° < \theta \le 90°$$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

2.3 Aeronautical ESIMs operating in the 27.5-29.5 GHz band, or parts thereof, within the territory of an administration that has authorized fixed-service and/or mobile-service operation in the same frequency bands shall not transmit in these frequency bands without prior agreement of that administration (see also *resolves* 3 of this Resolution).

2.4 The maximum power in the out-of-band domain should be attenuated below the maximum output power of the aeronautical ESIM transmitter as described in Annex 5 to Recommendation ITU-R SM.1541.

ANNEX 2 TO DRAFT NEW RESOLUTION [A116] (WRC-23)

Methodology with respect to the examination referred to in *resolves 1.2.* 2

VII. 1 OVERVIEW OF THE METHODOLOGY

Aeronautical earth station in motion (A-ESIMs) can operate over time at different locations defined by latitude, longitude and altitude. This methodology determines the maximum allowable off-axis e.i.r.p. spectral density ("$EIRP_C$") for an A-ESIM transmitter communicating with a non-GSO FSS satellite that would ensure compliance with a set of pre-established power flux-density (pfd) limits defined on the Earth's surface. This methodology derives the $EIRP_C$ considering the relevant loss and attenuation in the geometry considered, among other things.

The methodology then compares the computed $EIRP_C$ with the reference off-axis e.i.r.p. towards the ground ("$EIRP_R$") of the A-ESIM. For each emission in each group of a non-GSO satellite system, $EIRP_R$ can be calculated by using the Appendix **4** data for that system as well as other input parameters that shall be provided by the notifying administration for that system.

Specifically, for each emission in the ITU non-GSO satellite system associated with a to-be-defined non-GSO A-ESIM class of station, the $EIRP_R$ is the algebraic summation (in logarithmic terms) of the maximum power at the antenna flange (item C.8.a.1 of Appendix **4**), the peak gain of the A-ESIM antenna (item C.10.d.3 of Appendix **4**), the maximum achievable off-axis gain isolation towards the ground of the A-ESIM antenna and a parameter that would compensate for any difference between the emission bandwidth and the reference bandwidth of the pre-established set of pfd limits.

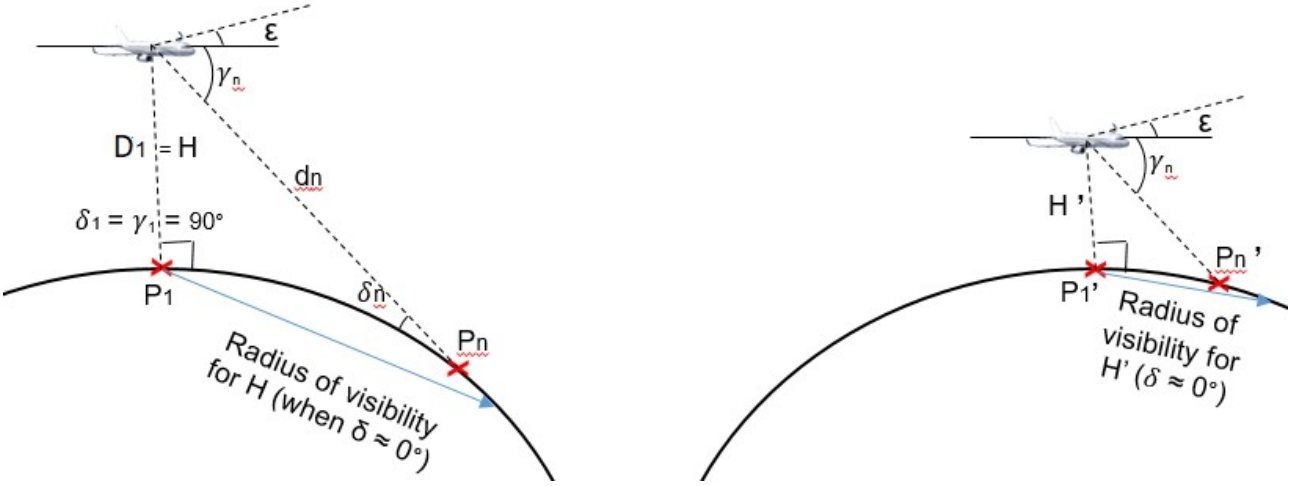
The operations of A-ESIMs shall be evaluated over multiple predefined altitude ranges in order to establish as many $EIRP_C$ levels for comparison with $EIRP_R$. This comparison is at the basis of the methodology and examination that are described more in detail in the following section. An examination by the Bureau would apply this methodology for each altitude range, to determine whether the A-ESIMs operating under a given ITU non-GSO satellite network would comply with the PFD limits defined on the Earth's surface to protect terrestrial services.

VIII. 2 PARAMETERS AND GEOMETRY

Figure A.2.1 provides a description of the geometry considered under this methodology. The figure shows A-ESIMs flying at two different altitudes and also some of the parameters used for the calculation. The model is agnostic to non-GSO ESIMs geographical locations on Earth and assumes a spherical Earth model with a fixed radius for the calculation.

FIGURE A2-1

Geometry for the examination of compliance for two different A-ESIM altitudes



The notifying administration for the non-GSO FSS network with which A-ESIMs communicates shall send to the Bureau the relevant characteristics of A-ESIMs intended to communicate with that non-GSO FSS network. All the parameters required by the Bureau to carry out the examination process are listed and briefly described in Table A2-1. Additional considerations are further elaborated in section 3.

TABLE A2-1

Relevant parameters for pfd compliance examination

Parameter	Symbol	Type of parameter	Observation
Aeronautical non-GSO ESIM altitude	H	Established by the methodology as: H_{min}= 0.01 km, H_{max}=15 km	The altitudes at which the examination is carried out range from H_{min} to H_{max} at the following altitudes: H_{min}, 1.01 km, 2.01 km, 3.00 km, 3.01 km, 4.01 km… H_{max}
Angle of arrival of the incident wave on the Earth's surface	δ	Specified by the pre-established set(s) of pfd limits, variable from 0° to 90°	pre-established set(s) of pfd should cover incident angles from 0° to 90°
Angle below the horizontal plane of the ESIM corresponding to the angle of arrival δ under examination	γ	Calculated from the geometry	This angle is calculated considering the non-GSO ESIM's altitude H_j examined and angle of arrival δ under examination (see Fig. A.2.1)
Distance between the ESIM and the point on the ground under examination	D	Calculated from the geometry	This distance is a function of the A-ESIM's altitude and the angles δ and γ
Frequency	f	Provided by the Appendix 4 data	To evaluate the propagation loss either at the center frequency or at the upper and lower limits of the frequency range
Atmospheric loss	L_{atm}	Calculated and established by the methodology	Based on Recommendation ITU-R P.676
Fuselage attenuation	L_f	Report ITU-R M.2221-0 or other ITU-R Reports or Recommendations	The attenuation depends on the angle γ below the horizontal plane of the non-GSO ESIM. The value(s) could come from ITU-R Reports and/or Recommendations, such as Report ITU-R M.2221. Note, the model contained in Report ITU-R M.2221-0 might require updating and/or clarifications.
A-ESIM antenna peak gain and off-axis gain pattern	G_{max}, $G(\theta)$	Taken from the Appendix **4** data (items C.10.d.3 and C.10.d.5.a.1, respectively) of the non-GSO system under examination	The A-ESIM antenna gain is used to compute $EIRP_R$
Emission bandwidth	$BW_{Emission}$	Taken from the Appendix **4** data (as part of item C.7.a) of the non-GSO system under examination	These two bandwidths shall be compared and a correcting factor needs to be included in the computation of $EIRP_R$ in case $BW_{Emission} < BW_{Ref}$
Reference bandwidth	BW_{Ref}	Taken from the set(s) of pre-established pfd limits	

Effective isotropic radiated power required for compliance with the pfd limits in a reference bandwidth	$EIRP_C$	$EIRP_C$ is the result of the calculation; it depends on the ESIM altitude and the angle of arrival (δ) of the incident wave on the Earth's surface	For each of the altitudes H_j, the e.i.r.p. for compliance is calculated for the different incident angles (δ) considered to cover all the range of the pfd limits to be established by WRC-23. This leads to a number of values of $EIRP_C$ associated to a given altitude H_j; for each altitude H_j, the lowest e.i.r.p. value is the one to be retained and compared with $EIRP_R$ (see section 3)

Note: No additional loss figure for polarisation discrimination is considered because it is likely captured in the calculation of fuselage attenuation.

IX. 3 CALCULATION PROCEDURE

This section includes a step-to-step description of how the examination methodology would be implemented for a given group associated to the class of earth station for non-GSO A-ESIMs in a non-GSO satellite system.

START

Calculate *$EIRP_R$*

i) For each of the emissions included in the Group under consideration, compute the Reference EIRP ($EIRP_R$, dB(W)) as:

$$EIRP_R = G_{Max} - G_{Isol_{Max}} + P_{Max} + 10\log_{10}(BW) \quad (1)$$

where:

G_{max} is the A-ESIM antenna peak gain in dBi

G_{Isol_Max} is the maximum achievable gain isolation of the A-ESIM antenna towards the ground in dB when operating in the examined non-GSO system

P_{max} is the maximum power density at the A-ESIM antenna flange in dB(W/Hz).

BW in Hz is:

BW_{Ref} if $BW_{emission} > BW_{Ref}$

$BW_{emission}$ if $BW_{emission} < BW_{Ref}$

Calculate *$EIRP_C$*

ii) For each aircraft altitude, it is necessary to generate as many δ_n angles (angle of arrival of the incident wave) as required in order to test the full compliance with the set(s) of pre-established pfd limits. The N angles δ_n shall be comprised between 0° and 90° and have a resolution compatible with the granularity of the pre-established pfd limits. Each of the angles δ_n will correspond to as many N points on the ground.

iii) For each altitude $H_j = H_{min}, \ldots, H_{max}$, compute $EIRP_{C\_j}$ using the following algorithm

a) Set the altitude of the A_ESIM to H_j

b) Compute the angle below the horizon $\gamma_{j,n}$ as seen from the A-ESIM for each of the N angles δ_n generated in ii) using the following equation:

$$\gamma_{j,n} = \arccos\left(\frac{R_e \cdot \cos(\delta_n)}{(R_e + H_j)}\right) \quad (2)$$

where R_e is the mean Earth radius.

c) Compute the distance $D_{j,n}$, in km, for n= 1, …, N between the A-ESIMs and the tested point on the ground:

$$D_{j,n} = \sqrt{R_e^2 + (R_e + H_j)^2 - 2\,R_e\,(R_e + H_j)\cos(\gamma_n - \delta_n)} \quad (3)$$

d) Compute the fuselage attenuation $L_{fj,n}$ (dB) applicable to each of the N points on the ground as a function of the angles $\gamma_{i,n}$ computed in *b)* above

e) Compute the atmospheric loss $L_{atm\_j,n}$ (dB) applicable to each of the distances $D_{i,n}$ computed in *c)* above

f) Compute the $EIRP_{C\_j,n}$ (dB(W/BW$_{Ref}$)), that is the maximum e.i.r.p. that can be radiated in the pfd mask's reference bandwidth by the A-ESIM towards each of the N points to be compliant with the set(s) of pre-established pfd limits, as per the following equation:

$$EIRP_{C\ i,n}(\delta_n, \gamma_n) = pfd(\delta_n) + 10\log_{10}\left(4\pi(D_{i,n} \cdot 1000)^2\right) + L_{f\ i,n} + L_{atm\ i,n} \quad (4)$$

g) Compute the minimum $EIRP_{C\_j}$ across all values calculated at the previous step, $EIRP_{C\_j}$ = Min ($EIRP_{C\_j,n}$ (δ_n, γ_n)). The output of this last step is the maximum $EIRP_C$ that can be radiated by the A-ESIM to ensure it complies with the set(s) of pre-established pfd limits with respect to all angles δ_n at the altitude H_j. There will be one $EIRP_{C\_j}$ for each of the H_j altitudes considered.

The output of step iii) is summarised in Table A2-2 below:

TABLE A2-2

Computed $EIRP_{C\_j}$ values

j	***H_j***	***$EIRP_{C\_j,n}$ (δ_n, γ_n)* dB(W/BW$_{Ref}$)**				***$EIRP_{C\_j}$***
-	(km)	δ = 0°	δ = 0.01°	…	δ = 90°	dB(W/BW$_{Ref}$)
1	H_{min}	xxx	xxx	xxx	xxx	XXX
2	…	yyy	yyy	yyy	yyy	YYY

…	…	…	…	…	…	…
j_{max}	H_{max}	zzz	zzz	zzz	zzz	ZZZ

Compare $EIRP_C$ and $EIRP_R$, and produce an examination finding

iv) For each of the emissions, check whether $EIRP_{C\_j} > EIRP_R$. The results of this check are illustrated in Table A2-3 below.

TABLE A2-3

Comparison between $EIRP_{C\_j}$ and $EIRP_R$

Group ID	Emission n.	$EIRP_R$ dB(W)	Is there at least one altitude H_j for which $EIRP_{C\_j} > EIRP_R$?	Smallest H_j for which $EIRP_{C\_j} > EIRP_R$ (km)
X	1	XXX	Yes/No	AAA
Y	2	YYY	Yes/No	BBB
…	…	…	…	…
Z	N	ZZZ	Yes/No	CCC

v) For the emissions included in the Group under examination which pass the test detailed in iv) above, the results of the Bureau's examination for that Group is ***favorable*** (after removing emissions that have failed the examination), otherwise it is ***unfavorable***.

vi) The Bureau shall publish:

– The finding (favorable or unfavorable) for each Group of the non-GSO system examined;

– Table A2-3, that is the output of step iii) of the algorithm.

Note: As part of standard procedure, the Bureau would publish the emissions with unfavourable findings in BR IFIC Part III-S, which concerns frequency assignments that are returned to the responsible administration.

X.

ANNEX 3 TO DRAFT NEW RESOLUTION [A116] (WRC-23)

Provisions for non-GSO FSS systems[21] transmitting to aeronautical and/or maritime ESIMs operating in or over an ocean in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz with respect to EESS (passive) operating in the frequency band 18.6-18.8 GHz (in accordance with *resolves* 1.1.4)

Any non-GSO fixed satellite space station operating in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz with with (i) an orbit apogee less than 20 000 km (ii) communicating with an aeronautical or maritime ESIM over the ocean, and (iii) for which complete notification information has been received by the Radiocommunication Bureau after 1 January 2025, shall not exceed an unwanted emission power flux-density produced at the surface of the ocean in the 18.6-18.8 GHz band, based on the following piecewise equation:

$$\textit{for } N \geq 10: \quad pfd = \min(-77 - 10 * \log(S), -110) \quad \text{dB}(\text{W}/(\text{m}^2 \cdot 200\ \text{MHz}))$$

$$\textit{for } N < 10: \quad pfd = \min(-67 - 10 * \log(S) - 10 * \log(N), -110) \quad \text{dB}(\text{W}/(\text{m}^2 \cdot 200\ \text{MHz}))$$

where S is the non-GSO fixed satellite space station 3 dB beam footprint area on the ground expressed in km² and N is the maximum number of co-frequency beams generated by the non-GSO fixed satellite system within a 10 000 000 km^2 square on the Earth;

[21] These provisions do not apply to non-GSO systems using orbits with an apogee less than 2000 km that employ a frequency reuse factor of at least three

USA/1.6/5 MOD

APPENDIX 4 (REV.WRC-19)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-19)

Footnotes to Tables A, B, C and D

MOD

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
***												
A.20	**COMPLIANCE WITH *resolves* 1.1.4 OF RESOLUTION 169 (WRC-19)**										**A.20**	
A.20.a	a commitment that the ESIM operation would be in conformity with the Radio Regulations and Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.20.a	
A.21	**COMPLIANCE WITH *resolves* 1.2.6 OF RESOLUTION 169 (WRC-19)**										**A.21**	
A.21.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which ESIMs communicate shall follow the procedures in *resolves* 4 of Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.21.a	
A.22	**COMPLIANCE WITH *resolves* 7 OF RESOLUTION 169 (WRC-19)**										**A.22**	
A.22.a	a commitment that aeronautical ESIMs would be in conformity with the pfd limits on the Earth's surface specified in Part II of Annex 3 to Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.22.a	
A.23	**COMPLIANCE WITH RESOLUTION 35 (WRC-19)**										**A.23**	
A.23.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.23.a	
A.24	**COMPLIANCE WITH NOTIFICATION OF A NON-GSO SHORT DURATION MISSION**										**A.24**	

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
A.24.a	a commitment by the administration that, in the case that unacceptable interference caused by a non-GSO satellite network or system identified as short-duration mission in accordance with Resolution **32 (WRC-19)** is not resolved, the administration shall undertake steps to eliminate the interference or reduce it to an acceptable level Required only for notification					+					A.24a	
A.25	**COMPLIANCE WITH *resolves* 1.1.1.1 OF RESOLUTION [A116] (WRC-23)**		**A.25**	-								
A.25.a	a commitment that the ESIM operation would be in conformity with the Radio Regulations and Resolution **[A116] (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **[A116] (WRC-23)**					+					A.25.a	
A.26	**COMPLIANCE WITH *resolves* 1.1.4 OF RESOLUTION [A116] (WRC-23)**		**A.26**									
A.26.a	a commitment that the ESIM operation would be in conformity with the *resolves* 1.1.4 of Resolution **[A116] (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **[A116] (WRC-23)**					+					A.26.a	
A.267	**COMPLIANCE WITH *resolves* 4 OF RESOLUTION [A116] (WRC-23)**		**A.27**	-								
A.2~~1~~7.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which ESIMs communicate shall follow the procedures in *resolves* 5 of Resolution **[AI116} (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **[A116] (WRC-23)**					+					A.27.a	
A.2~~7~~8	**COMPLIANCE WITH *resolves* 1.2.2 OF RESOLUTION [A~~I~~116] (WRC-23)**		**A.28**	-								

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification of a geostationary-satellite network (including space operation functions under Article 2A	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
A.~~27~~8.a	a commitment that aeronautical ESIMs would be in conformity with the pfd limits on the Earth's surface specified in Part II of Annex 1 to Resolution **[A116] (WRC-23)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **[A116] (WRC-23)**					+					A.28.a	

Reasons: Consequential

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RESOLUTION 173 (WRC-19)

Use of 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) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service

Reasons: Consequential

WRC-23 Agenda Item 1.17

IWG-3 members were not able to reach consensus on a proposal for WRC-23 agenda item (AI) 1.17, and, therefore, it forwards views on how the FCC could handle this matter. The key outstanding difference is on the protection of incumbent systems.

VIEW A

Addresses *resolves 3 d)*, Annex 4 b) and Annex 4 f) of Document IWG-3/85r2 (23.03.23).

Resolves 3 d)

This View addresses *resolves 3 d)* and Annex 4 b) of Document IWG-3 085 which did not reach consensus agreement in IWG-3. The matter concerns protection of non-GSO MSS feeder links (non-GSO MSS FLs) operating in the bands 19.3-19.7 GHz (space-to-Earth) and 29.1-29.5 GHz (Earth-to-space) from proposed ISL user space stations.

Concerning the 19.3-19.7 MSS feeder link (space-to-Earth) band, the opposition's contention that existing coordination agreements between operators/administrations that have already agreed to power levels that protect the gateway earth station and should be retained does not address the specific concerns related to non-GSO MSS FLs operating in the frequency band 19.3-19.7 GHz, and the potential interference from new ISS user space stations intended to operate with existing FSS networks.

Coordination agreements to protect non-GSO MSS FLs operating in the 19.3-19.7 MHz band may exist. However, the details of such agreements are confidential and not subject to review by the BR or other parties. Moreover, limits that might be agreed in private coordinate agreements do not contemplate ISL user space stations. Further, ISL proponents are advocating a "no-coordination" approach to new ISL user space station deployment. Effectively, ISL proponents advocate a "do nothing" approach to protection. Consequently, a power flux-density limit is needed to protect existing and future non-GSO MSS FL deployments in the 19.3-19.7 GHz band. The limit of -148 dB(W/(m^2 · MHz)) in *resolves 3 d)* of Document [85…] is derived from ITU-R studies submitted by the United States to ITU-R WP 4a, and provides an approach that ensures protection of non-GSO MSS FL gateways. This result confirms Iridium's contention that new ISL space stations cannot be considered "just another FSS terminal user – like a VSAT fixed on the Earth." Rather, ISL space stations represent a new type of space station with new interference mechanisms and geometries, and new requirements to protect non-GSO MSS FL frequencies.

Concerning the opposition's preferred construction for protecting non-GSO MSS FLs in the 19.3-19.7 GHz band, given here:

c) a GSO or non-GSO space station communicating with a non-GSO space station in the frequency band 19.3-19.7 GHz, or part thereof, shall not produce a power flux-density that exceeds −148 dB(W/(m^2 · MHz)) on the surface of the Earth towards non-GSO mobile satellite gateway stations. [These limits may be exceeded on the territory of any country whose administration has so agreed;]

The language highlighted in yellow is unnecessary and not something enforceable through the Radio Regulations. Problematically, the yellow highlighted text implies that an Administration that has deployed non-GSO MSS FL Earth stations can forego the above protection requirement. The goal should be to protect the use of the 19.3-19.7 GHz bands for current and future non-GSO MSS FL use, not just to protect individual stations within certain administrations. In addition, by retaining the ISL proponents yellow highlighted text, it is not clear whether other provisions applicable to the 19.3-19.7 GHz band could then be exceeded (e.g. limits defined to protect terrestrial operations) as the text would create regulatory ambiguity. Finally, it is not clear how the transmissions from inter-satellite links could be controlled to the specificity of individual country territories in order to meet varying technical requirements. Thus, the yellow highlighted text should be removed from [Doc. 085] and the remainder of the text – including the pfd limit – retained as written.

Annex 4 b)

Regarding the uplink band (29.1-29.5 GHz), the difference between the -70 and -62 dBW/Hz power spectral density limits is related to apportioning the interference budget under ITU-R Rec. S.1323. Iridium attributes interference to new ISL space stations separately from regular FSS user stations (for example, a VSAT), because it believes the interference mechanisms, geometries, and ISL operations cannot be considered as the same as "regular" FSS traffic.

For example, a non-GSO MSS FL receive beam could overlap and be exposed to operations within a number of spot beams of the FSS service providers' satellite(s), and the frequency assignments within these spot beams that reuse the 29.1-29.5 GHz frequency band. The level of exposure, and those potential interference, would be traffic-dependent. To account for this potential aggregate interference from FSS service provider satellite operations falling within non-GSO MSS FL receive beams, all flavors of traffic should be analyzed to derive protection criteria. However, ISL proponent studies only model non-GSO ISL user space station traffic and but ignored the presence of existing FSS space station traffic as a potential interference source. Converesly, ITU-R studies presented by Iridium have apportioned the interference budget and protection criteria for MSS FL between new non-GSO ISL user space stations and existing FSS traffic (VSATs, ESIM, etc.). According to these ITU-R studies, the required power density limit is determined to be -70 dBW/Hz.

To ensure proper protection of non-GSO MSS FL, based on the ITU-R studies it is clear that the protection levels for MSS feeder links in the frequency bands 19.3-19.7 GHz and 29.1-29.5 GHz should not exceed -148 dB(W/(m2 · MHz)) and a power spectral density of -70 dBW/Hz, respectively. Further, ISL proponents do not provide any evidence to support the claim that the proposed protection levels are overly restrictive for ISL operation, and therefore, the recommended protection levels should be adopted.

Annex 4 f)

The document also includes provision f) in Annex 4 that addresses how to protect incumbent NGSO (Earth-to-space) systems from interference of small antennas with high input power levels. The View A Provision f) of Annex 4 has been in the draft CPM text since May of 2022. This is the only piece of Annex 4 that provides protection from high sidelobe levels of small antennas in the 27.5-29.1 GHz and 29.5-30 GHz frequency bands.

View A should be retained, as the impact of the View B mask to the incumbent service has not been studied. The new proposed provision f) would increase the allowable sidelobe EIRP levels by as high as 7.15 dB, as shown in Figure 1 below.

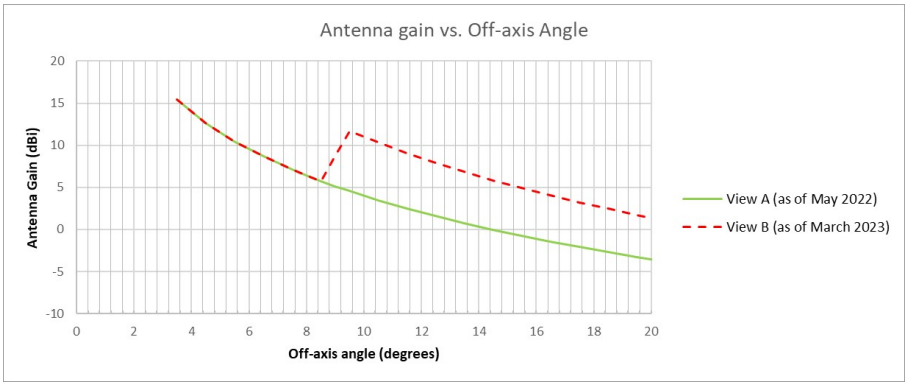


Figure 1: View A antenna mask vs. View B antenna mask

Provision f) of Annex 4 should be retained in its original form (without any square brackets), as follows:

f) For off-axis angles greater than 3.5 degrees, the off-axis e.i.r.p. emissions of any non-GSO space station transmitting in the 27.5-29.1 GHz and 29.5-30 GHz bands to communicate with a non-GSO ISS system with a minimum operational altitude higher than 2 000 km shall not exceed the envelope generated by the combination of an input power spectral density at the antenna flange of −62 dBW/Hz coupled with

the off-axis gain derived from 29-25 log(□) dBi for angles between 3.5 degrees and 20 degrees.

The EIRP envelope generated by provision f) combines input power and antenna gain. View B proponents may utilize antennas that do not meet 29-25 log (□) dBi provided the input power is reduced to still meet the EIRP envelope of provision f). Increased sidelobe levels increase the probability of interference into incumbent systems.

View B – Protection of non-geostationary FSS feeder-links and use of tiered off-axis power limits

The United States should not propose overly restrictive limits in the frequency bands 19.3-19.7 GHz and 29.1-29.5 GHz to protect FSS feeder links for non-GSO mobile-satellite service systems. In preparation of studies conducted under WRC-23 agenda item 1.17, concerns were expressed in the use of some assumptions that resulted in more constraining limits associated with View A. The differences in values were never resolved within the United States, however the View B proponents request the following be considered:

Retain the text in the parenthetical in DRAFT NEW RESOLUTION [USA/A117-B2], *resolves* 3 *c*)

- The -148 dBW/m^/MHz level was derived using an approach that includes an additional 10% sub-apportionment of the protection criteria, which is inconsistent with Recommendation ITU-R S.1323. Recommendation ITU-R S.1323 only prescribes apportionment on per-system basis and does not include any further apportionments in its methodology
- This provision is written to apply a pfd limit on the surface of the Earth towards a non-GSO mobile satellite gateway stations, however this would require knowledge of the locations of every non-GSO MSS satellite gateway earth station. Gateway locations are not readily known, however this would be known as a result of coordination of normal downlink FSS space-to-Earth operations.
- If the parenthetical reference were to be removed and only the pfd limit remains as a mandated provision, it would overly constrain current operators/Administrations that already have coordination agreements in place at higher levels. Since ISS is not subject to coordination in this proposal, an operator/Administration already protecting a gateway earth station would have no recourse but to meet this new limit to operate satellite-to-satellite links.

Support a maximum power spectral density -62 dBW/Hz in provision *b*) of Annex 4 to DRAFT NEW RESOLUTION [USA/A117-B2]

- Similar to the above argument, the -70 dBW/Hz was derived using an approach that includes an additional 10% sub-apportionment of the protection criteria, which is inconsistent with Recommendation ITU-R S.1323.
- The sub-apportionment factor of 10% is not an approved methodology in any ITU-R Recommendations and has no basis.

Create tiered off-axis power limits in provision *f)* of Annex 4 to DRAFT NEW RESOLUTION [USA/A117-B2]

The United States should not propose overly restrictive off-axis power limits in the frequency bands 27.5-29.1 and 29.5-30.0 GHz. For Ka-band ISL user space stations, a deployable mesh antenna is best suited to reduce size, weight, and power and launch volume. Its support structure, however, includes regularly spaced attachment points that increase the sidelobes, for off-axis angles in the range of 10-20 degrees, above what is expected for a similar metal dish reflector. Ka-band ISL users discovered this issue very recently when receiving initial supplier antenna patterns.

- View A's off-axis power limits are unworkable, as drafted. In turn, the View B proponents propose alternate tiered off-axis power limits, as follows, to address the increased sidelobes while protecting primary services:
    - *For off-axis angles greater than 3.5 degrees, the off-axis e.i.r.p. emissions of any non-GSO space station transmitting in the 27.5-29.1 GHz and 29.5-30 GHz bands to communicate with a non-GSO ISS system with a minimum operational altitude higher*

than 2 000 km shall not exceed the envelope generated by the combination of an input power spectral density at the antenna flange of −62 dBW/Hz coupled with the off-axis gain derived from [29-25 log(φ) dBi for angles between 3.5 and 8.5 degrees, -44.82 + 5.95(φ) for angles between 8.5 and 9.5 degrees, and 43-32log(φ) for angles between 9.5 and 20 degrees.]

- View B would continue to protect primary services. In the IWG-3 process, NGSO fixed satellite service and terrestrial service interests expressed concern.
    - *NGSO fixed-satellite service.* OneWeb had raised concerns about the small off-axis angles. View B leaves untouched all off-axis angle limits below 8.5 degrees. Further, the relevant previous studies showed significant margin available that would ensure further protection here.
    - *Terrestrial services.* CTIA had raised possible concern that changing provision f) could have a ripple effect on terrestrial services and the associated PFD limits. That is not the case. The proposed off-axis mask changes do not affect terrestrial services because none of the Ka-band ISL user sidelobes radiate the Earth's surface. For example, for a user terminal operating within the cone of coverage at an altitude of 325 km, the minimum angle between the boresight of the user terminal and the Earth is 35.84 degrees. Because the View A mask only extends to 20 degrees, none of the increased sidelobe power will illuminate the Earth. This minimum angle increases at higher altitudes. The Ka-band ISL user would have to operate significantly outside the cone of coverage (which is impermissible under the U.S. proposal) for Earth surface radiation to occur.
- Keeping View B is necessary. Potential Ka-band ISL users are a limited number of Earth exploration-satellite service, space research service, and space operation service interests. Agenda item 1.17 is useless if such parties cannot make use of the new Ka-band ISL allocations when protections are available for existing primary services. Further, potential Ka-band ISL users were not involved in the discussions over a year ago when two non-user space station interests agreed to the View A off-axis angle power limits.

View B is supported by: SES/O3b, the Boeing Company, Planet.

Authors: *IWG-3 AI 1.17 Offline*

UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.17

Agenda Item 1.17: to determine and carry out, on the basis of 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.
Resolution **773 (WRC-2019)**: *Study of technical and operational issues and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz*

Background Information: There is an increasing need for space station operations in low-Earth orbit for scientific, academic, and commercial purposes. These stations vary in size from as large as the International Space Station to as small as single unit cubesats[22] and have wide ranging data requirements. Users of these systems meet requirements to move data from space to Earth, or other satellite terminal locations in an efficient manner.
This agenda item addresses using satellite-to-satellite links under a new inter-satellite service allocation for relaying data obtained from space science, Earth science, human exploration missions, and industrial and medical activities in space to and from the Earth using a GSO or a non-GSO FSS service provider space station that is operating at an orbital altitude greater than that of the non-GSO user space station generating the data.
Users of satellite-to-satellite links and their host satellite service providers will need to fully protect the current and future incumbent services in bands that may become available for satellite-to-satellite links. To this end, the ITU-R has conducted sharing and compatibility studies to assess the feasibility of introducing satellite-to-satellite links in many of the frequency bands called out in Resolution **773 (WRC-19)**. In addition, the ITU-R conducted a spectrum needs analysis to determine the estimated spectrum required for future space science, Earth science and human exploration missions through the year 2040. Based on the above studies, the United States of America proposes that use of satellite-to-satellite links for space science, space operation, Earth science, human exploration missions, and industrial and medical activities in space be recognized in the Radio Regulations within the inter-satellite service (ISS) in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz with transmissions limited to the same direction of transmission (e.g., Earth-to-space direction or space-to-Earth direction) of the GSO or non-GSO service providers' space station.
Further, non-GSO user space stations using satellite-to-satellite links shall only transmit and receive within the cone of coverage[23] of the associated GSO or non-GSO service provider space stations. Non-GSO user space stations will always operate at an orbital altitude that is lower than the orbital altitude of the network or system with which it is communicating. The non-GSO user would operate inter-satellite

[22] A single unit cubesat has dimensions of 10x10x10 centimeters and typical mass less than 2 kilograms.

[23] The cone of coverage is the conical volume of space defined by a cone whose apex is at the service provider space station and whose base does not extend beyond the edge of the notified service area of the individual service provider space station.

links in a manner that would replicate the operations of other users of the service provider network or system. Other user space stations, e.g., a space science satellite, would include ISS frequencies and operate under a contract with the FSS network or system operator providing the inter-satellite service.
In addition to adding a new ISS allocation to Article 5 of the Radio Regulations, the United States of America proposes a new WRC-23 Resolution that provides satellite-to-satellite link operating conditions and regulatory provisions to ensure protection of incumbent services' operations.
Further, the United States of America proposes no change to the Radio Regulations for the frequency band 11.7-12.7 GHz due to lack of sufficient ITU-R studies necessary to ensure the protection of incumbent services while supporting satellite-to-satellite link operations in this frequency range.
Finally, as a consequence of the proposals described above, the United States of America proposes suppression of Resolution 773 (WRC-19).

Proposals:

NOC USA/AI1.17/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

11.7-13.4 GHz

Reasons: Limited ITU-R studies were done in accordance with Resolution **773 (WRC-19)** supporting only satellite-to-satellite link operations in the downlink direction in the frequency range 11.7-12.7 GHz with no corresponding uplink direction spectrum.

MOD USA/AI1.17/2

15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.1-18.4	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Earth-to-space) 5.520 INTER-SATELLITE ADD 5.A117 MOBILE 5.519 5.521	

ADD **USA/AI1.17/3**

5.A117 The use of the inter-satellite service is limited to communications between fixed-satellite service space stations and non-geostationary systems operating with frequency assignments in the space

research, space operation and/or Earth exploration-satellite services, or for transmissions of data originating from industrial and medical activities in space. Such use shall be in accordance with Resolution **[USA/A117-B2] (WRC-23)** and is not subject to No. **9.11A**. No. **4.10** does not apply. (WRC-23)

MOD USA/AI**1.**17/4

18.4-22 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.4-18.6	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A INTER-SATELLITE ADD 5.A117 MOBILE	
…		
18.8-19.3	FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A INTER-SATELLITE ADD 5.A117 MOBILE	
19.3-19.7	FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523E INTER-SATELLITE ADD 5.A117 MOBILE	
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	

MOD USA/AI1.17/5

24.75-29.9 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
27.5-28.5	FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE 5.538 5.540	
28.5-29.1	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
29.1-29.5	FIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A INTER-SATELLITE ADD 5.A117 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

MOD USA/AI1.17/6

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.9-30	FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 INTER-SATELLITE ADD 5.A117 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542	

MOD USA/AI1.17/7

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section V − Limits of power flux-density from space stations

TABLE **21-4** (REV.WRC-23)

Frequency band	Service*	Limit in dB(W/m^2) for angles of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	**5°-25°**	**25°-90°**	
...					
17.7-19.3 GHz [7, 8]	Fixed-satellite (space-to-Earth) Inter-satellite Meteorological-satellite (space-to-Earth)	**0°-5°** −115 [14, 15] or −115 − X [13]	**5°-25°** −115 + 0.5(δ − 5) [14, 15] or −115 − X + ((10 + X)/20) (δ − 5) [13]	**25°-90°** −105 [14, 15] or −105 [13]	1 MHz
17.7-19.3 GHz [7, 8]	Fixed-satellite (space-to-Earth) Inter-satellite	**0°-3°** −120 [16]	**3°-12°** −120 + (8/9) (δ − 3) [16]	**12°-25°** −112 + (7/13) (δ − 12) [16]	−105 [16]	1 MHz
19.3-19.7 GHz	Fixed-satellite (space-to-Earth) Inter-satellite	**0°-3°** −120 [16]	**3°-12°** −120 + (8/9) (δ − 3) [16]	**12°-25°** −112 + (7/13) (δ − 12) [16]	−105 [16]	1 MHz
...						

MOD USA/AI1.17/8

APPENDIX 4 (REV.WRC-23)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

[2] The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Space Services). (WRC-12)

MOD

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION (Rev.WRC-23)

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section III of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
A.19.b	a commitment in accordance with *resolves* 1.5 of Resolution **156** (**WRC-15**) that the administration responsible for the use of the assignment shall implement *resolves* 1.4 of Resolution **156** (**WRC-15**) Required only for geostationary-satellite networks operating in the fixed-satellite service in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz communicating with transmitting earth stations in motion				+						A.19.b	
A.20	**COMPLIANCE WITH *resolves* 1.1.4 OF RESOLUTION 169 (WRC-19)**										**A.20**	
A.20.a	a commitment that the ESIM operation would be in conformity with the Radio Regulations and Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.20.a	
A.21	**COMPLIANCE WITH *resolves* 1.2.6 OF RESOLUTION 169 (WRC-19)**										**A.21**	
A.21.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which ESIMs communicate shall follow the procedures in *resolves* 4 of Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.21.a	
A.22	**COMPLIANCE WITH *resolves* 7 OF RESOLUTION 169 (WRC-19)**										**A.22**	
A.22.a	a commitment that aeronautical ESIMs would be in conformity with the pfd limits on the Earth's surface specified in Part II of Annex 3 to Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.22.a	
A.22*bis*	**COMPLIANCE WITH *resolves further* 2 OF RESOLUTION [USA/A117-B2] (WRC-23)**										**A.22*bis***	
A.22*bis*.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the non-GSO transmitting space station in frequency bands 27.5-29.1 and 29.5-30 GHz which communicate to a GSO FSS network or non-GSO FSS system, and in frequency band 29.1-29.5 GHz which communicate to a GSO FSS network, shall follow the procedures in *resolves further* 2 of Resolution **[USA/A117-B2] (WRC-23)** Required only for the notification of non-GSO space stations submitted in accordance with Resolution **[USA/A117-B2] (WRC-23)**				±	±					A.22*bis*.a	
A.22*ter*	**COMPLIANCE WITH *resolves* 5 OF RESOLUTION [A117-B2] (WRC-23)**										**A.22*ter***	
A.22*ter*.a	a commitment by the notifying administration for a non-GSO FSS system with an orbital apogee of less than 20 000 km communicating with lower orbiting non-GSO space stations in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz that the pfd shall be in conformity with the pfd limits on the Earth's surface specified in Annex 3 to Resolution **[USA/AI117-B2] (WRC-23)** Required only for the notification of non-GSO space stations submitted in accordance with Resolution **[USA/AI117-B2] (WRC-23)**					±					A.22*ter*.a	

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
A.23	**COMPLIANCE WITH RESOLUTION 35 (WRC-19)**										**A.23**	
A.23.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.23.a	
A.24	**COMPLIANCE WITH NOTIFICATION OF A NON-GSO SHORT DURATION MISSION**										**A.24**	
A.24.a	a commitment by the administration that, in the case that unacceptable interference caused by a non-GSO satellite network or system identified as short-duration mission in accordance with Resolution **32 (WRC-19)** is not resolved, the administration shall undertake steps to eliminate the interference or reduce it to an acceptable level Required only for notification					+					A.24.a	
A.25	INCLUSION OF INTER-SATELLITE SERVICE OPERATIONS										A.25	
A.25.a	the calculated worst-case off-axis angle between the main lobe of the space station transmitting in the frequency bands 27.5-30 GHz, or parts thereof, and the Earth's surface		X		X	X					A.25.a	
A.25.b	An indicator for non-GSO systems receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz showing the commitment that the equivalent power flux-density produced at any point in the geostationary-satellite orbit by emissions from all combined operations of inter-satellite and typical earth station transmissions shall not exceed the limits given in Table **22-2**		X		X	X					A.25.b	
A.25.c.1	The minimum absolute sub-satellite point latitude under which a non-GSO system transmitting in the frequency bands 27.5-28.6 GHz and 29.5-30 GHz is not transmitting		X		X	X					A.25.c.1	
A.25.c.2	The minimum absolute sub-satellite point latitude under which a non-GSO system receiving in the frequency bands 27.5-28.6 GHz and 29.5-30 GHz is not receiving		X		X	X					A.25.c.2	

Reasons: Six new Appendix 4 data elements are added to provide indicators for inter-satellite link operating in accordance with Resolution [USA/A117-B2] (WRC-23)

ADD USA/AI1.17/9

DRAFT NEW RESOLUTION [USA/A117-B2] (WRC-23)

Use of the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz by the inter-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is growing interest for utilizing satellite-to-satellite links for a variety of applications;

b) that the inter-satellite service (ISS) is defined as a radiocommunication service providing links between artificial satellites;

c) that the ITU Radiocommunication Sector (ITU-R) has carried out sharing and compatibility studies between incumbent services in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and adjacent bands and satellite-to-satellite transmissions in the fixed-satellite service (FSS);

d) that these studies were based on certain principles including limited directionality, use of power control and antenna steering capabilities and compliance with applicable epfd and off-axis e.i.r.p. limits;

e) that the frequency bands 18.1-18.6, 18.8-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space) are also allocated to terrestrial and space services used by a variety of different systems, and these existing services and their future development need to be protected, without the imposition of undue constraints, from the operation of ISS links,

recognizing

a) that any course of action taken under this Resolution with respect to ISS links has no impact on the coordination requirements with other services which are otherwise subject to coordination, regardless of date of receipt;

b) that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments of the geostationary-satellite orbit (GSO) FSS satellite network or the non-GSO FSS system with which non-GSO space stations communicate or on the coordination requirements of that satellite network,

recognizing further

that in accordance with Section 6 of the Rules of Procedure associated with No. **11.32**, whenever a network is composed of GSO and non-GSO space stations, the related assignments shall not be considered as being subject to the coordination procedure under Section II of Article **9**,

resolves

1 that, for a non-GSO space station subject to this Resolution communicating with a GSO or non-GSO space station using ISS links within the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or parts thereof, the following conditions shall apply:

a) the non-GSO space station transmitting in the frequency bands 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall only operate inter-satellite links when its apogee altitude[1] is lower than the minimum operational altitude[2] of the GSO or non-GSO space station it communicates with and when the off-nadir angle between this GSO or non-GSO space station and the non-GSO space station it communicates with is less than or equal to θ_{Max} (as defined in Annex 1 to this Resolution);

[1] See item A.4.b.4.d of Appendix **4**.

[2] See item A.4.b.4.f of Appendix **4**.

b) the GSO or non-GSO space station receiving in the frequency bands 27.5-30 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall only operate inter-satellite links when its minimum operational altitude is higher than the apogee altitude of the non-GSO space station with which it communicates;

c) that frequency assignments in the inter-satellite service operating on GSO or non-GSO space stations receiving in the frequency bands 27.5-30 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall also have assignments which are in the fixed-satellite service;

d) the non-GSO ISS space station transmitting in the frequency 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 and 18.8-20.2 GHz, or parts thereof, shall remain within the envelope of the characteristics of ground-based earth stations of the GSO or non-GSO space station with which it communicates;

2 that non-GSO space stations subject to this Resolution receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall not claim protection from FSS and mobile-satellite service (MSS) networks and systems as well as terrestrial services operating in conformity with the Radio Regulations;

3 that GSO and non-GSO space stations subject to this Resolution:

a) receiving in the frequency band 27.5-30 GHz from non-GSO space stations shall not claim protection for inter-satellite links from FSS and MSS networks and systems as well as terrestrial services operating in conformity with the Radio Regulations;

b) shall comply with the provisions contained in Article **21** in the frequency band 18.1-18.6 GHz and 18.8-19.7 GHz to protect terrestrial services;

c) a GSO or non-GSO space station communicating with a non-GSO space station in the frequency band 19.3-19.7 GHz, or part thereof, shall not produce a power flux-density on the surface of the Earth towards a non-GSO mobile satellite gateway station that exceeds -148 dB(W/(m^2 · MHz)). [These limits may be exceeded on the territory of any country whose administration has so agreed;]

4 that non-GSO space stations transmitting in the frequency bands 27.5-30 GHz, or part thereof:

a) shall not produce a power flux-density at any point in the GSO arc greater than the power flux-density produced by earth stations associated with the satellite network/system with which they communicate as determined in Annex 5 to this Resolution;

b) shall not cause unacceptable interference to or otherwise impose constraints on operation or development of the non-GSO FSS service and protect non-GSO FSS space stations by complying with the provisions contained in Annex 4 to this Resolution;

c) when transmitting in the frequency band 29.1-29.5 GHz, shall limit communications to GSO FSS space stations, and shall not cause unacceptable interference to or otherwise impose constraints on the operation or development of feeder link operating in the FSS to serve non-GSO mobile-satellite service systems operating in the band 29.1-29.5 GHz; the conditions in Annex 4 b) shall apply;

d) for application of the provisions contained in Annex 4, the BR shall examine the characteristics of non-GSO space stations transmitting under the ISS allocation with respect to

the conformity of the total e.i.r.p. and e.i.r.p. spectral density limits as specified and publish the results of such examination in the BR IFIC;

e) shall comply with the provisions contained in Annex 2 to this Resolution for protection of terrestrial services in the frequency band 27.5-29.5 GHz;

f) for application of the provisions contained in Annex 2, the BR shall examine the characteristics of non-GSO space stations transmitting under the ISS allocation with respect to the conformity of the power flux-density (pfd) limits on the Earth's surface as specified and publish the results of such examination in the BR IFIC;

5 that, with respect to the Earth exploration-satellite service (EESS) (passive) operating in the frequency band 18.6-18.8 GHz, any non-GSO FSS system with an orbital apogee of less than 20 000 km communicating with lower orbiting non-GSO space stations in the frequency bands 18.3-18.6 GHz and 18.8-19.1 GHz and for which the complete notification information has been received by the Radiocommunication Bureau (BR) after 1 January 2025 shall comply with the provisions indicated in Annex 3 to this Resolution;

resolves further

1 that, subject to this Resolution:

a) the notifying administration of the non-GSO system choosing to operate ISS links and receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz shall indicate to the BR the commitment that the equivalent power flux-density produced at any point in the geostationary-satellite orbit by emissions from all combined operations of ISS links and typical earth station transmissions shall not exceed the limits given in Table **22-2**;

b) the notifying administration of the non-GSO space station/stations transmitting in the frequency bands 27.5-30.0 GHz towards a GSO network and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall send to the BR the relevant Appendix **4** (advance publication) information containing the characteristics of the non-GSO space station/stations and the associated name of the notified GSO network(s) with which it intends to communicate;

c) the notifying administration of the non-GSO space station/stations transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30.0 GHz bands towards a non-GSO system and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall send to the BR the relevant Appendix **4** (advance publication) information containing the characteristics of the non-GSO space station/stations and the associated name of the notified non-GSO system(s) with which it intends to communicate;

d) the notifying administration of the GSO FSS network or non-GSO FSS system receiving in the frequency bands 27.5-30 GHz, or portions thereof, with which non-GSO transmitting space stations communicate shall follow the procedures in *resolves further* 3;

e) the notifying administration for the non-GSO transmitting space station receiving in the frequency bands 27.5-30 GHz which communicates to a GSO FSS network or non-GSO FSS system shall send to the BR a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the non-GSO transmitting space station which communicates to a GSO FSS network or non-GSO FSS system shall follow the procedures in *resolves further* 2;

2 that in case of unacceptable interference caused by a non-GSO space station transmitting in the frequency bands 27.5-30.0 GHz:

a) the notifying administration for the non-GSO space station transmitting in the frequency bands 27.5-30.0 GHz shall cooperate with an investigation on the matter and provide, to the extent of its ability, any required information on the operation of the transmitting space station and a point of contact to provide such information;

b) the notifying administration for the non-GSO space station transmitting in the frequency bands 27.5-30.0 GHz and the notifying administration of the GSO or non-GSO network or system with which the non-GSO transmitting space station communicates shall, jointly or individually, as the case may be, upon receipt of a report of unacceptable interference, take a required action to eliminate or reduce interference to an acceptable level;

3 that the administration responsible for the GSO or non-GSO network or system with which the non-GSO transmitting space station communicates shall ensure that:

a) for the operation of non-GSO space stations transmitting in the ISS in the frequency bands 27.5-30.0 GHz, techniques are employed to maintain pointing accuracy with the associated space station, without inadvertently tracking adjacent GSO satellites or non-associated non-GSO satellites;

b) all necessary measures are taken so that non-GSO transmitting space stations in the frequency bands 27.5-30.0 GHz in the ISS are subject to permanent monitoring and control by a network control and monitoring centre (NCMC) or equivalent facility in order to comply with the provisions in this Resolution, and are capable of receiving and acting upon at least "enable transmission" and "disable transmission" commands from the NCMC or equivalent facility;

c) a permanent point of contact is provided for the purpose of tracing any suspected cases of unacceptable interference from non-GSO transmitting space stations in the frequency bands 27.5-30.0 GHz in the ISS and to immediately respond to requests from the focal point;

4 that, upon receipt of the information in *resolves further* 1*a)* to 1*e)*, the BR shall examine that information with respect to the existing regulatory provisions, as well as any conditions prescribed in this Resolution, and publish the result of such examination in the International Frequency Information Circular (BR IFIC),

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, if and when required;

2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution;

3 that, upon examination of the information submitted by the notifying administration under *resolves further* 1*b)* or 1*c)*, if no recorded ISS frequency assignments for the relevant frequency bands can be identified for the GSO FSS network or non-GSO FSS system with which the notifying administration's non-GSO space station intends to communicate, the BR shall return the information to the notifying administration with an unfavourable finding;

4 to use the methodology given in Appendix 1 to Annex 2 of this Resolution when assessing compliance with the pfd limits in Annex 2;

5 not to examine, under No. **11.31**, the conformity of non-GSO FSS systems with the provisions of *resolves* 5 of this Resolution.

ANNEX 1 TO DRAFT NEW RESOLUTION [USA/A117-B2] (WRC-23)

Determination of the off-nadir angle

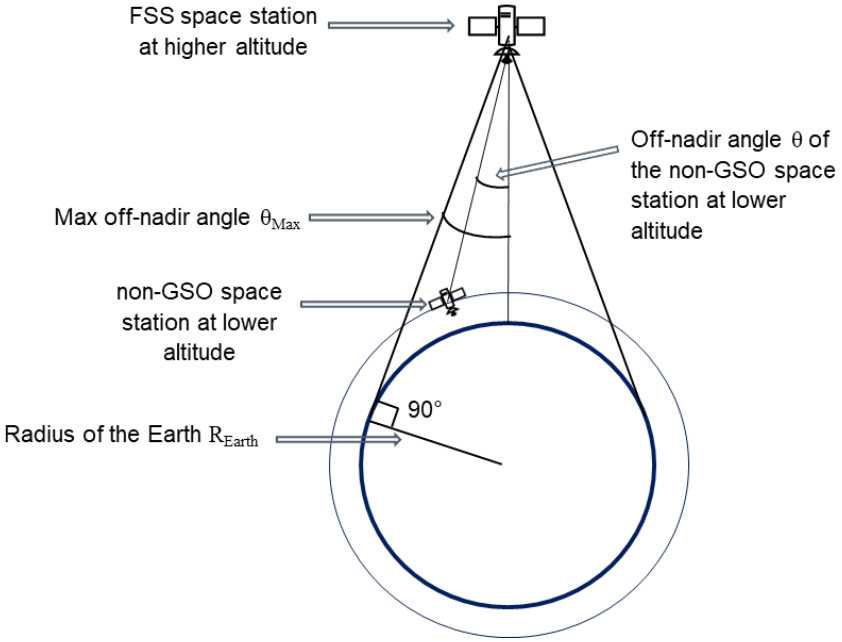
1 a non-GSO space station transmitting in the frequency bands 27.5-30 GHz) and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall only communicate with a GSO or non-GSO FSS space station when the off-nadir angle between this GSO or non-GSO FSS space station and the non-GSO space station with which it communicates is equal to or smaller than:

$$\theta_{Max} = \sin^{-1}\left(\frac{R_{Earth}}{R_{Earth} + Alt_{Higher\_FSS}}\right)$$

where:

R_{Earth} = 6 378 km

Alt_{Higher_FSS} = altitude of the GSO or non-GSO space station at higher orbital altitude in km.



2 In case the notified service area of the GSO or non-GSO FSS network/system at higher orbital altitude is not global, the maximum off-nadir angle θ_{Max} will vary at each azimuth according to the notified service area and there will be a specific maximum off-nadir angle associated to each azimuth based on the position in space of the FSS network/system at higher orbital altitude and the geographic coordinates (latitude, longitude) of the border of the notified service area at each azimuth, which are extracted from the Graphical Interference Management System (GIMS) database container that was submitted to the BR when notifying a specific non-global service area.

$$\theta_{Max} = \cos^{-1}\left(\frac{\left(R_{Earth} + Alt_{FSS\_SS}\right)^2 + dist^2 - R_{Earth}^{\ 2}}{2\times\left(R_{Earth} + Alt_{FSS\_SS}\right)\times dist}\right)$$

with:

$$dist = \sqrt{\left(X_E - X_S\right)^2 + \left(Y_E - Y_S\right)^2 + \left(Z_E - Z_S\right)^2}$$

$$X_E = R_{Earth}\times\cos\left(lat_{sab}(\varphi)\right)\times\cos\left(lon_{sab}(\varphi)\right)$$

$$Y_E = R_{Earth}\times\cos\left(lat_{sab}(\varphi)\right)\times\sin\left(lon_{sab}(\varphi)\right)$$

$$Z_E = R_{Earth}\times\sin\left(lat_{sab}(\varphi)\right)$$

$$X_S = \left(R_{Earth} + Alt_{FSS\_SS}\right)\times\cos\left(lat_{SS}\right)\times\cos\left(lon_{SS}\right)$$

$$Y_S = \left(R_{Earth} + Alt_{FSS\_SS}\right)\times\cos\left(lat_{SS}\right)\times\sin\left(lon_{SS}\right)$$

$$Z_S = \left(R_{Earth} + Alt_{FSS\_SS}\right)\times\sin\left(lat_{SS}\right)$$

where:

$lat_{sab}(\varphi)$ = latitude of the service area border for the azimuth φ

$lon_{sab}(\varphi)$ = longitude of the service area border for the azimuth φ

lat_{SS} = latitude of the sub-satellite point of the GSO/non-GSO space station

lon_{SS} = longitude of the sub-satellite point of the GSO/non-GSO space station.

ANNEX 2 TO DRAFT NEW RESOLUTION [USA/A117-B2] (WRC-23)

Provisions for non-GSO space stations transmitting in the frequency bands 27.5-30.0 GHz to protect terrestrial services in the frequency band 27.5-29.5 GHz

The maximum pfd produced at the surface of the Earth by emissions from a non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.1-29.5 GHz shall not exceed:

$pfd(\theta) = -136.2$ (dB(W/(m^2 · 1 MHz)))
for $0° \leq \theta \leq 0.01°$

$pfd(\theta) = -132.4 + 1.9 \cdot \log(\theta)$(dB(W/(m^2 · 1 MHz)))
for $0.01° < \theta \leq 0.3°$

$pfd(\theta) = -127.7 + 11 \cdot \log(\theta)$(dB(W/(m^2 · 1 MHz)))
for $0.3° < \theta \leq 1°$

$pfd(\theta) = -127.7 + 18 \cdot \log(\theta)$(dB(W/(m^2 · 1 MHz)))
for $1° < \theta \leq 2°$

$pfd(\theta) = -129.4 + 23.7 \cdot \log(\theta)$(dB(W/(m^2 · 1 MHz)))
for $2° < \theta \leq 8°$

$pfd(\theta) = -108$ (dB(W/(m^2 · 1 MHz)))
for $8° < \theta \leq 90.0°$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

APPENDIX

To check the compliance of the non-GSO emissions with the PFD mask described in Annex 2, the following procedures shall be followed.

1) Note: a is the orbital altitude (km) of the non-GSO system identified in *resolves further 1c)* or in *resolves further 1b)*, PSD is the power spectral density in 1 MHz, and compute the off-axis gain pattern Gtx(φ), with φ being the off-axis angle in the direction of the terrestrial receiver. Assume the Earth is a sphere whose radius, Re, is 6378 km.
2) Compute the angle, as seen from the non-GSO system transmitting in frequency range 27.5-29.5 GHz (the user space station), between the centre of the Earth and the GSO network or non-GSO systems receiving in the frequency range 27.5-29.5 GHz (the service provider space station) assuming that the user is at the edge of the cone of coverage with the formula:

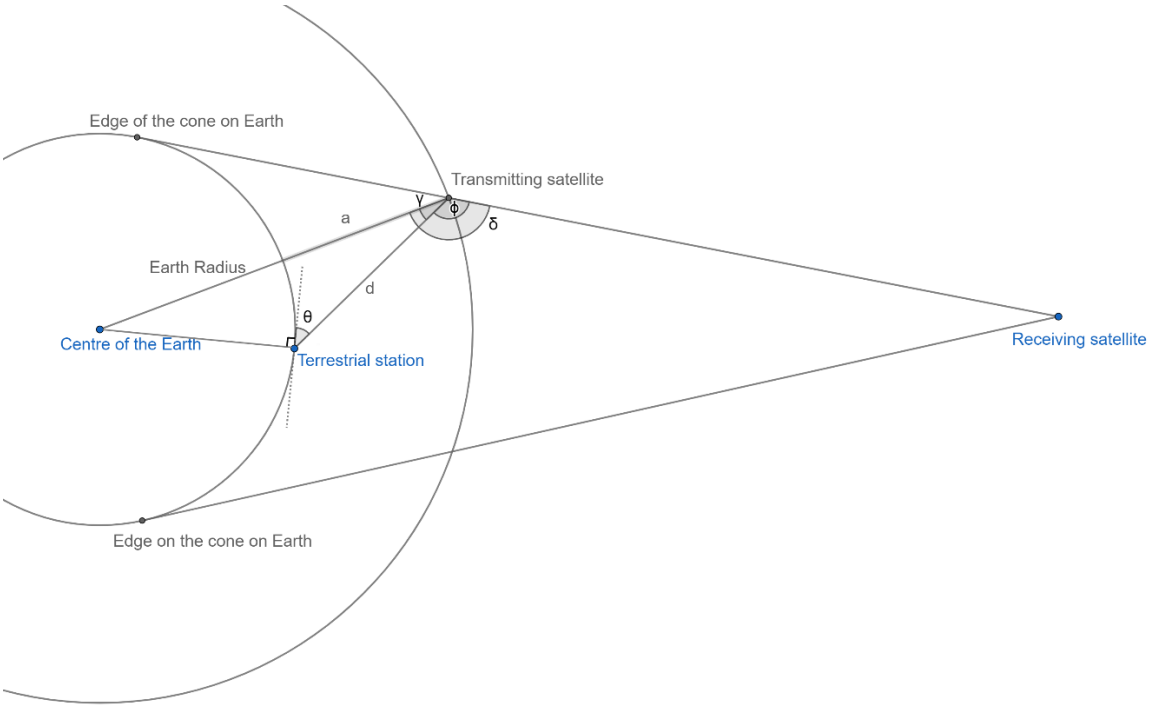
$$\delta = \arcsin\left(\frac{R_e}{R_e + a}\right)$$

3) Sweep angle of arrival to the terrestrial station, θ from 0 to 90 degrees in 0.1 degree increments.
4) Compute satellite angle $\gamma = \arcsin\left(\frac{\sin(90+\theta)}{R_e+a} * R_e\right)$
5) Compute off-axis angle $\varphi = 180 - \delta - \gamma$
6) Compute the gain Gtx in dBi towards the Earth point for each of the angles from step 5, using the user space station transmit antenna pattern.
7) Compute slant Range $d = (R_e + a)\frac{\sin(90-\gamma-\theta)}{\sin(90+\theta)}$

8) Compute the atmospheric attenuation A_{atm} in dB, for the corresponding angle of arrival, θ using ITU-R Recommendation P.676-13 with the mean global standard atmosphere from ITU-R Recommendation P.835-6.

9) Compute the PFD on the ground as:

$$PFD = PSD + Gtx(\varphi) - A_{atm}(\theta) - 10 \times \log_{10}(4\pi\, d^2)$$



ANNEX 3 TO DRAFT NEW RESOLUTION [USA/A117-B2] (WRC-23)

Provisions for non-GSO space stations[24] transmitting in the frequency bands 18.1-18.6 GHz and 18.8-19.3 GHz towards non-GSO space stations to protect EESS (passive) in the frequency band 18.6-18.8 GHz (see *resolves* 5)

Non-GSO fixed-satellite space stations operating with an orbit apogee less than 20 000 km in the frequency bands 18.1-18.6 GHz and 18.8-19.3 GHz when communicating with a non-GSO space station as described in *resolves* 1*a)* shall not exceed a power flux-density produced at the surface of the oceans across the 200 MHz of the 18.6-18.8 GHz band, of −118 dB(W/(m^2 · 200 MHz)).

[24] These provisions do not apply to non-GSO systems using orbits with an apogee less than 2000 km that employ a frequency reuse factor of at least three.

ANNEX 4 TO DRAFT NEW RESOLUTION [USA/A117-B2] (WRC-23)

Provisions for non-GSO space stations transmitting in the frequency band 27.5-30.0 GHz to protect non-GSO space stations

The following conditions for non-GSO space stations transmitting in the frequency band 27.5-30.0 GHz to protect non-GSO space stations shall apply:

a) Any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a GSO ISS network shall not exceed the following on-axis e.i.r.p. spectral density limits:

– for non-GSO space station transmit on-axis antenna gains greater than 40.6 dBi: −17.5 dBW/Hz;

– for non-GSO space station transmit on-axis antenna gains less than 40.6 dBi: −17.5 − (40.6 − X) dBW/Hz

where X is the on-axis gain of the non-GSO space station antenna in dBi.

b) To protect FSS feeder links to non-GSO mobile-satellite service systems the following conditions for non-GSO space stations and systems transmitting in the frequency band 29.1-29.5 GHz shall apply:

– emissions from any non-GSO space station communicating with a GSO network shall not exceed a maximum power spectral density of –70dBW/ −62 dBW/Hz at the input of the antenna of the non-GSO space station;

– any non-GSO space station communicating with a GSO network shall have a minimum antenna diameter of 0.3 m whose gain shall not exceed the gain envelope of Recommendation ITU-R S.580-6;

– non-GSO space stations communicating with a GSO network shall only operate in orbits with inclination between 80 and 100 degrees;

– non-GSO systems communicating with a GSO network shall not contain more than 100 satellites.

c) Non-GSO space stations transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz shall not operate at orbital altitudes between 900 km and 1290 km.

d) Any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a non-GSO FSS system with a minimum operational altitude higher than 2 000 km shall not exceed an on-axis e.i.r.p. spectral density of −20 dBW/Hz and the total e.i.r.p. shall not exceed:

Transmitting non-GSO space station operational altitude (km)	Maximum total e.i.r.p. (dBW)
< 450	63
450 to < 600	61

600 to < 750	58
750 to 900	55
> 1290	N/A

e) Any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz to communicate with a non-GSO FSS system with a minimum operational altitude lower than 2 000 km shall not exceed an on-axis e.i.r.p. spectral density of −30 dBW/Hz and the total e.i.r.p. shall not exceed:

Transmitting non-GSO space station operational altitude (km)	Maximum total e.i.r.p. (dBW)
< 450	60
450 to < 600	58
600 to < 750	55
750 to 900	53
> 1290	N/A

f) [View A: For off-axis angles greater than 3.5 degrees, the off-axis e.i.r.p. emissions of any non-GSO space station transmitting in the 27.5-29.1 GHz and 29.5-30 GHz bands to communicate with a non-GSO ISS system with a minimum operational altitude higher than 2 000 km shall not exceed the envelope generated by the combination of an input power spectral density at the antenna flange of −62 dBW/Hz coupled with the off-axis gain derived from 29-25 log(φ) dBi for angles between 3.5 degrees and 20 degrees.

View B: For off-axis angles greater than 3.5 degrees, the off-axis e.i.r.p. emissions of any non-GSO space station transmitting in the 27.5-29.1 GHz and 29.5-30 GHz bands to communicate with a non-GSO ISS system with a minimum operational altitude higher than 2 000 km shall not exceed the envelope generated by the combination of an input power spectral density at the antenna flange of −62 dBW/Hz coupled with the off-axis gain derived from [29-25 log(φ) dBi for angles between 3.5 and 8.5 degrees, -44.82 + 5.95(φ) for angles between 8.5 and 9.5 degrees, and 43-32log(φ) for angles between 9.5 and 20 degrees.]

ANNEX 5 TO DRAFT NEW RESOLUTION [USA/A117-B2] (WRC-23)

Provisions for non-GSO space stations transmitting in the frequency band 27.5-30.0 GHz bands to protect GSO space stations

1) In the frequency bands 27.5-30 GHz, when a non-GSO system as identified in *resolves further* 1*b)* identifies an associated GSO network, as described in *resolves further* 1*b)*, to operate inter-satellite links, the BR shall perform the examination in Appendix 1 to this Annex.

2) The notifying administration of the GSO network identified in 1) above shall commit that the non-GSO space stations with which it communicates will respect all bilateral coordination agreements that have already been signed, noting the provisions from *resolves further* 1*d)*, 1*e)*, 2 and 3.

3) In the frequency band 28.6-29.1 GHz, when a non-GSO system as identified in *resolves further* 1*c)* identifies an associated non-GSO system, as described in *resolves further* 1*c)*, to operate inter-satellite links, the BR shall perform the examination in Appendix 2 to this Annex.

4) The notifying administration of the receiving non-GSO network identified in 3) above shall commit that the transmitting non-GSO space stations with which it communicates will respect all bilateral coordination agreements that have already been signed, noting the provisions from *resolves further* 1*d)*, 1*e)*, 2 and 3.

5) In the frequency bands 27.5-28.6 and 29.5-30 GHz, the pfd on the geostationary arc produced by a non-geostationary-satellite system as mentioned in *resolves further* 1*c)* shall never exceed -163 dBW/m²/40 kHz. A computation methodology is provided in Appendix 3 to this Annex.

APPENDIX 1

The aim of this Appendix is to provide a method to be used by the BR to assess whether the emissions from a non-GSO space station operating inter-satellite links with a GSO space station are within the envelope of the typical Earth stations of the GSO network.

Step 1: For each beam in the Earth-to-space direction of the receiving GSO network notification, compute the maximum e.i.r.p. produced in one hertz, noted EIRPSD.

Step 2: Compute the reduction in free space loss at the altitude of the user using:

$$\Delta FSL = 20\log_{10}\left(\frac{GSO_{alt}}{GSO_{alt} - NGSO_{alt}}\right)$$

Where $NGSO_{alt}$ is the altitude of the transmitting non-GSO system space stations, and GSO_{alt}=35786 km. It should be noted that if several altitudes are included in the notification, each altitude shall be tested.

Step 3: Compute the reduced e.i.r.p. spectral density as $EIRPSD_{reduced} = EIRPSD - \Delta FSL$

Step 4: For all beams in the non-GSO system notification with a class station XY, compute the maximum e.i.r.p. in one hertz, noted $EIRPSD_{ngso}$.

Step 5: Frequency assignments to non-GSO systems shall receive a favorable finding with respect to Annex 5 if, for all beams, $EIRPSD_{ngso}$ does not exceed the $EIRPSD_{reduced}$ quantity, computed at the same altitude, otherwise the assignments shall receive an unfavorable finding.

APPENDIX 2

The aim of this Appendix is to provide a method to be used by the BR to assess whether the emissions from a non-GSO space station operating inter-satellite links with a non-GSO space station are within the envelope of the typical Earth stations of the non-GSO system.

Step 1: For each beam in the Earth-to-space direction of the receiving non-GSO system notification, compute the maximum e.i.r.p. produced in one hertz, noted EIRPSD.

Step 2: Compute the reduction in free space loss at the altitude of the user using:

$$\Delta FSL = 20 \log_{10}\left(\frac{GSO_{alt}}{GSO_{alt} - NGSO_{alt}}\right)$$

Where $NGSO_{alt}$ is the altitude of the transmitting non-GSO system space stations, and GSO_{alt}=35786 km. It should be noted that if several altitudes are included in the notification, each altitude shall be tested.

Step 3: Compute the reduced e.i.r.p. spectral density as $EIRPSD_{reduced} = EIRPSD - \Delta FSL$

Step 4: For all beams in the non-GSO system notification with a class station XY, compute the maximum e.i.r.p. in one hertz, noted $EIRPSD_{ngso}$.

Step 5: Frequency assignments to non-GSO systems shall receive a favorable finding with respect to Annex 5 if, for all beams, $EIRPSD_{ngso}$ does not exceed the $EIRPSD_{reduced}$ quantity, computed at the same altitude, otherwise the assignments shall receive an unfavorable finding.

APPENDIX 3

To check the compliance of the non-GSO emissions with the pfd limit given in Annex 5, *5)*, the following procedure shall be followed.

Step 1: For each of the positions for the user, the service provider, and a virtual GSO victim as described below:

Station	Parameter	Value
Transmitting non-GSO system as identified in *resolves further 1c)*	Latitude	Range [A.25.c.1, inclination of the orbit] °
	Longitude	0°
	Altitude	station altitude km
Receiving non-GSO system, as	Latitude	Range [A.25.c.2,

Station	Parameter	Value
described in *resolves further 1c)*		inclination of the orbit] °
	Longitude	0°
	Altitude	station altitude km
Virtual GSO victim	Latitude	0°
	Longitude	0°
	Altitude	35786 km

Step 2: Assume that the user points towards the service provider, compute the off-axis angle towards the virtual GSO victim

Step 3: Using the off-axis angle from step 2, and the antenna parameters of the user, compute the off axis gain Gtx of the user towards the virtual GSO victim

Step 4: Compute the distance d from the user to the service provider in meters

Step 5: Compute the PFD produced at the virtual GSO victim by:

$$PFD = PSD + Gtx - 10 \times \log_{10}(4\pi d^2)$$

where PSD is the power spectral density of the user.

Step 6: Frequency assignments to non-GSO systems shall receive a favorable finding with respect to Annex 5, *5)* if all PFD values are below the threshold given in Annex 5, *5)*.

Reasons: Proposal to have a check whether the emissions are within the envelope of typical ESs of the service provider. In the epfd band, a pfd limit is provided to ensure GSO protection.

SUP USA/AI1.17/10

RESOLUTION 773 (WRC-19)

Study of technical and operational issues and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz

Reasons: Adoption by WRC-23 of the aforementioned proposals satisfies the agenda item and therefore Resolution **773 (WRC-19)** is no longer needed.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9, Topic 9.1 a)

Agenda Item 9, topic 9.1 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;*

Background:

Space weather refers to the physical processes occurring in the space environment that ultimately affects human activities on Earth and in space. Space weather is influenced by the solar wind and the interplanetary magnetic field (IMF) carried by the solar wind plasma. These disturbances can result in a hazardous radiation environment for satellites and humans at high altitudes, ionospheric disturbances, geomagnetic field variations, and the aurora. These effects can in turn impact a number of services and infrastructure located on the Earth's surface, airborne, or in Earth orbit. These disturbances are measured by sensors at various frequencies. Further, disturbances in the ionosphere and atmosphere have important impacts on radio communication, satellite navigation systems and heat the atmosphere which increases the atmospheric drag experienced by LEO satellites, including the International Space Station and earth exploration satellite service systems. Radionavigation-satellite service (RNSS) signals, which are used for a growing number of precision positioning, navigation, and timing applications, as well as for sounding the atmosphere using radio-occultation, are affected by space weather as they propagate through the ionosphere.

In response to Resolution **657 (Rev.WRC-19)**, the ITU-R has undertaken the study of the technical and operational characteristics and spectrum requirements of active and receive-only spectrum-reliant space weather sensor systems. Resolution **657 (Rev.WRC-19)** also invited the ITU-R to conduct studies with the objective of determining the appropriate radio service or services that would apply to space weather sensors. The ITU-R conducted a review of existing radiocommunications services as potential candidates under which space weather sensors can operate.

Receive-only space weather sensors enable observations through the detection of signals from natural origin as well as receiving signals of opportunity from other radiocommunication services (e.g. radionavigation-satellite service (RNSS)). All receive-only space weather observations should be operated in the same radiocommunication service, in order to allow for a consistent framework for the protection of these applications. Thus, the appropriate radiocommunication service for the receive-only usage of space weather sensors needs to have a suitable definition which can cover all of these different types of sensors and observation methodologies. While the radio astronomy service (RAS) could be an appropriate radiocommunication service for sensors observing signals from cosmic origin, its definition does not cover the observations of signals of opportunity. On the other hand, the definition of the meteorological aids service (MetAids) may be able to accommodate all space weather sensors.

Active space sensors generally emit radio pulses which are then mainly reflected by the ionosphere back to the same sensor system. The reflection in the high atmospheric layers depends on the applied frequency of the radio pulse, where the reflected signal provides information on the physical characteristics of these

layers which are important for characterising impacts on RNSS and HF signals in general. Active sensor systems could also be included under the MetAids.

It should be noted that frequency selection for the sensor systems is dependent upon the scientific parameters being measured and their associated physics and includes frequency bands from 0.01 MHz to 80 GHz (see latest version of Report ITU-R RS.2456).

Resolution **657 (Rev.WRC-19)** asks for necessary sharing studies with incumbent systems operating in frequency bands used by space weather sensors. No sharing or compatibility studies were undertaken by the ITU-R.

Proposal:

NOC USA/9.1A/1

ARTICLES

Reason: Changes to the Radio Regulations are outside the scope of Agenda Item 9.1.

NOC USA/9.1A/2

APPENDICES

Reason: Changes to the Radio Regulations are outside the scope of Agenda Item 9.1.

SUP USA/9.1A/3

RESOLUTION 657 (REV.WRC-19)

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

Reason: While the current version of Resolution 657 lacks specificity on the application radio service, candidate frequency bands, and regulatory provisions for continued studies, it is also associated with a preliminary agenda item for WRC-27. Action here is consistent with action being taken under the preliminary agenda item.

_____

WRC-23 Agenda Item 10

Future Agenda Item proposal to review and update

IWG-3 members were not able to reach consensus on a draft U.S. proposal for WRC-23 Agenda Item 10, Item 2.2 from the Preliminary agenda for the 2027 World Radio Conference, which was to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution 176 (WRC-19);

This document provides two views on the appropriate regulatory changes the FCC should consider. View A is document IWG-3/073R1 submitted by SES based on Resolution 812 (WRC-19), item 2.2 and proponents who wish to include non-geostationary space stations in the fixed-satellite service in the FAI proposal. View B is based on comments received to document IWG-3/073R1 from CTIA.

View A is supported by: SES, Amazon, Intelsat and Mangata Networks

View B is supported by: CTIA

VIEW A

View A: Adopt an agenda item to study and develop technical, operational and regulatory measures, facilitating the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service

Agenda Item 10, FAI

Reference: IWG-3/073R1(20.03.23)

Supported by SES, Amazon, Intelsat and Mangata Networks

View A recommends that the U.S. adopt a proposal to support a 2027 World Radio Conference agenda item, which is to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service.

Proponents of View A believes that there has been great progress with the regulatory solution developed from the outcome at WRC-19 for earth station in motion communicating with GSOs and the pending regulatory solution for earth stations in motion communication with NGSOs, and the adoption of Item 2.2 from the Preliminary agenda for the 2027 World Radio Conference, Resolution 812 (WRC-19), will reap great benefits. This will be not only allow for more advances in technology but also greater ability to utilize the understanding to date of compatibility of earth station in motion communication with FSS space stations and incumbent services.

For the reasons stated above, the organizations and companies listed above urge FCC to adopt the attached draft proposal for a WRC-23 Agenda Item 10 proposal for a future agenda item.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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

Use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service

Background

Resolution 176 (WRC-19) calls for studies on the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service.

The ITU-R has addressed aeronautical and maritime earth stations in motion (ESIM) operating with GSO FSS satellites at several previous WRCs, which have adopted technical and regulatory regimes to allow such operations. In the Radio Regulations, Resolution 902 (WRC-03), and relevant parts of Resolutions 156 (WRC-15) and 169 (WRC-19) define technical and regulatory rules to allow GSO FSS networks to communicate with ESIM to provide broadband communications.

With the advances made in satellite manufacturing and earth station technology, ESIMs have already become more widespread and very practical for communications on the move. Consequently, the utilization of Ku and Ka-band frequency spectrum for providing ESIM connectivity is growing exponentially to meet user demands, which may lead to scarcity in spectral resources in these bands.

Advances and enhancements in antenna and terminal technology have enabled the usage of the 50/40 GHz frequency bands for GSO FSS networks, and therefore it is prudent to study the sharing of compatibility under a new resolution.

ADD USA/10(Q/V FSS)/1

DRAFT NEW RESOLUTION [AI 10] (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 WRC-27;

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 WRC-23 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:

2 to review and update regulatory provisions for the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service;

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, 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 WRC-27;

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.

Reasons: To provide for studies, consideration of item 2.2 from Preliminary WRC-27 agenda for the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service.

MOD USA/10(Q/V FSS)/2

RESOLUTION [Q V FSS] (WRC-27)

Use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion Communicating with geostationary and non-geostationary space stations in the fixed-satellite service

The World Radiocommunication Conference (~~Sharm el Sheikh~~Dubai, ~~2019~~2023),

considering

a) that the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS);

b) that there is an increasing need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing aeronautical and maritime earth stations in motion (ESIMs) to communicate with FSS space stations operating in the frequency bands 37.5-40.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space);

c) that in the FSS, there are geostationary-satellite (GSO) and non-geostationary networks operating and/or planned for near-term operation in the frequency bands allocated to the FSS in the frequency range 37.5-51.4 GHz;

d) that some administrations have already deployed, and plan to expand their use of, ESIMs with operational and future GSO FSS networks;

e) that GSO and non-GSO FSS networks in the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-
42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) are required to be coordinated and notified in accordance with the provisions of Articles 9 and 11;

f) that the frequency bands 37.5-39.5 GHz, 40.5-42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations, and these existing services and their future development should be protected without undue constraints;
g) the need to encourage the development and implementation of new technologies in the FSS at frequencies above 30 GHz,

recognizing

a) ~~a)~~ that Article 21 contains power flux-density (pfd) limits for GSO FSS;
~~a)~~b) that Article 22 contains equivalent power flux-density (EPFD) limits for non-GSO

b) that advances in technology, including the use of tracking techniques, allow ESIMs to operate within the characteristics of fixed earth stations of the FSS;

c) that WRC-15 adopted No. 5.527A and Resolution 156 (WRC-15) related to ESIMs;

d) that ESIMs addressed by this Resolution are not to be used for safety-of-life applications;

e) that the frequency bands 40.5-42 GHz (space-to-Earth) in Region 2, 47.5-47.9 GHz (space-to-Earth) in Region 1, 48.2-48.54 GHz (space-to-Earth) in Region 1, 49.44-50.2 GHz (space-to-Earth) in Region 1 and 48.2-50.2 GHz (Earth-to-space) in Region 2 are identified for use by high-density applications in the FSS (No. 5.516B);

f) that the frequency bands 37-40 GHz, 40.5-43.5 GHz are available for high-density applications in the fixed service (No. 5.547);

g) that the pfd in the frequency band 42.5-43.5 GHz produced by any GSO space station in the FSS (space-to-Earth) or the broadcasting-satellite service (BSS) operating in the frequency band 42-42.5 GHz shall not exceed, at the site of any radio astronomy station, the values listed in No. 5.551I;

h) that the allocation of the spectrum for the FSS in the frequency bands 42.5-43.5 GHz and 47.2-50.2 GHz for Earth-to-space transmission is greater than that in the frequency band 37.5-39.5 GHz for space-to-Earth transmission in order to accommodate feeder links to broadcasting satellites, and administrations are urged to take all practicable steps to reserve the frequency band 47.2-49.2 GHz for feeder links for the BSS operating in the frequency band 40.5-42.5 GHz (No. 5.552);

i) that the allocation to the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high-altitude platform stations, and the use of the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions of Resolution 122 (Rev.WRC-19) (No. 5.552A);

j) that the use of the frequency bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the FSS (space-to-Earth) is limited to GSO satellites (No. 5.554A);

k) that the pfd in the frequency band 48.94-49.04 GHz produced by any GSO space station in the FSS (space-to-Earth) operating in the frequency bands 48.2-48.54 GHz and 49.44-50.2 GHz shall not exceed 151.8 dB(W/m2) in any 500 kHz band at the site of any radio astronomy station (No. 5.555B);

l) that, in the frequency bands 49.7-50.2 GHz, 50.4-50.9 GHz and 51.4-52.6 GHz, Resolution 750 (Rev.WRC-19) applies, and Nos. 5.338A, 5.340 and 5.340.1 apply among other provisions of the Radio Regulations;

m) that the fixed and mobile services are allocated on a primary basis in the frequency bands 37.5-42.5 GHz and 47.2-50.2 GHz on a global basis;

n) that the frequency band 37.5-38 GHz is allocated to the space research service (SRS) (deep space) in the space-to-Earth direction and the frequency band 40.0-40.5 GHz is allocated to the SRS and the Earth exploration-satellite service (EESS) in the Earth-to-space direction on a primary basis;

o) that the frequency bands 37.5-40.5 GHz and 38-39.5 GHz are also allocated to the EESS in the space-to-Earth direction on a secondary basis;

p) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the EESS (passive) and SRS (passive), which need to be adequately protected;

q) that all allocated services in these frequency bands should be taken into account,

resolves to invite the ITU Radiocommunication Sector

1 to study the technical and operational characteristics of aeronautical and maritime ESIMs that plan to operate within GSO and non-GSO FSS allocations in the frequency bands 37.5-39.5 GHz, 40.5-42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz;

2 to study sharing and compatibility between aeronautical and maritime ESIMs operating With GSO and non-GSO FSS networks in the frequency bands 37.5-39.5 GHz, 40.5-42.5 GHz, 47.2-50.2 GHz* and 50.4-51.4 GHz* and current and planned stations of existing services allocated in these frequency bands and, where appropriate, in adjacent frequency bands, in order to ensure protection of, and not impose undue constraints on, those services;

3 to develop, for different types of ESIM, technical conditions and regulatory provisions for their operation, taking into account the results of the studies above,

invites the 2027 World Radiocommunication Conference

to consider the results of the above studies and take necessary actions, as appropriate, provided that the results of the studies referred to in resolves to invite the ITU Radiocommunication Sector are complete and agreed by the radiocommunication study groups.

Reason: Perform sharing and compatibility for a new FSS allocation in Q and V bands while also ensuring the protection of primary allocations for incumbent services.

* For the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz, sharing and compatibility studies for aeronautical ESIM should take into account all necessary steps to protect the terrestrial services to which the frequency band is allocated to.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR [XXX]

Subject: to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution **[QV FSS] (WRC-23)**;
Origin: United States of America

Proposal*:* to enable the establishment of spectrum allocation and associated regulatory provisions to support in specific frequency bands, geostationary and non-geostationary space stations in the fixed-satellite service **[QV FSS] (WRC-23)**;

Background/reason:
To provide a means for recognizing in the Radio aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service in specific frequency ranges in accordance with Resolution **[QV FSS] (WRC-23)**;

Radiocommunication services concerned:
Fixed-satellite service, Fixed Service, Mobile Service, Space Research Service, Land Mobile, Broadcasting, Broadcasting-Satellite

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Q/V band studies for FSS services for services such as gateways.

Studies to be carried out by: ITU-R ITU-R WP 4A as responsible group	*with the participation of:* Other relevant WPs, Administrations, Sector Members

ITU-R Study Groups concerned: SG 4, SG 5, and SG 7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Remarks

VIEW B

View B: Adopt an agenda item to study and develop technical, operational and regulatory measures, facilitating the use of the frequency bands 40-42 GHz (space-to-Earth), 48.2-50.2 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service

Agenda Item 10, FAI

Reference: CTIA comments received to IWG-3/073R1(20.03.23)

Supported by CTIA

View B

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Introduction

This proposal calls for studies on the use of the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service. These bands are proposed as they are consistent with the FCC's Memorandum Opinion and Order[25] which established "core" satellite bands for more extensive end-user terminals. In that record, satellite operators argued that transmitting end-user terminals will not be able to share spectrum with UMFUS systems that are widely deployed[26].

The ITU-R has addressed aeronautical and maritime earth stations in motion (ESIM) operating with GSO FSS satellites at several previous WRCs, which have adopted technical and regulatory regimes to allow such operations. In the Radio Regulations, Resolution 902 (WRC-03), and relevant parts of Resolutions 156 (WRC-15) and 169 (WRC-19) define technical and regulatory rules to allow GSO FSS networks to communicate with ESIM to provide broadband communications.

With the advances made in satellite manufacturing and earth station technology, ESIMs have already become more widespread and very practical for communications on the move. Consequently, the utilization of Ku and Ka-band frequency spectrum for providing ESIM connectivity is growing exponentially to meet user demands, which may lead to scarcity in spectral resources in these bands.

Advances and enhancements in antenna and terminal technology have enabled the usage of the 50/40 GHz frequency bands for GSO FSS networks, and therefore it is prudent to study the sharing of compatibility under a new resolution.

[25] https://www.fcc.gov/document/fcc-takes-next-steps-facilitating-spectrum-frontiers-spectrum

[26] See para 188.

ATTACHMENT

Agenda Item 10

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

Preliminary WRC-27 agenda item 2.2

2.2 to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service, in accordance with Resolution 176.

MOD USA/10(Q/V FSS)/1

RESOLUTION 176 (WRC-19)

Use of the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service

Reasons: As this is from the Preliminary WRC-27 Agenda Items, Resolution must be suppressed, as WRC-23 will create a new Resolution that will be included on the agenda for WRC-27.

RESOLUTION [Q V FSS] (WRC-27)

**Use of the frequency bands
40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space)
by aeronautical and maritime earth stations in motion,
Communicating with geostationary and non-geostationary space stations
in the fixed-satellite service**

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS);

b) that there is an increasing need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing aeronautical and maritime earth stations in motion (ESIMs) to communicate with FSS space stations operating in the frequency bands 40.-42. GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space);

c) that in the FSS, there are geostationary-satellite (GSO) and non-geostationary networks operating and/or planned for near-term operation in the frequency bands allocated to the FSS in the frequency range 37.5-51.4 GHz;

d) that GSO and non-GSO FSS networks in the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) are required to be coordinated and notified in accordance with the provisions of Articles 9 and 11;

e) that the frequency bands 40-42 GHz and 48.2-50.2 GHz are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations, and these existing services and their future development should be protected without undue constraints;

recognizing

~~b)~~c) that Article 21 contains power flux-density (pfd) limits for GSO FSS;

~~c)~~d) that Article 22 contains equivalent power flux-density (EPFD) limits for non-GSO

~~d)~~e) that 21.16.4 notes that the Article 21 limits on NGSO FSS operations were developed for systems operating with 99 or fewer satellites and that further studies are necessary to develop applicable limits on systems operating with 100 or more satellites;

d) that ESIMs addressed by this Resolution are not to be used for safety-of-life applications;

e) that the frequency bands 40-40.5 GHz (space-to-Earth) in all Regions, 40.5-42 GHz (space-to-Earth) in Region 2, 48.2-48.54 GHz (space-to-Earth) in Region 1, 49.44-50.2 GHz (space-to-Earth) in Region 1 and 48.2-50.2 GHz (Earth-to-space) in Region 2 are identified for use by high-density applications in the FSS (No. 5.516B);

f) that the frequency bands 40.5-43.5 GHz are available for high-density applications in the fixed service (No. 5.547);

g) that the 37-43.5 GHz band is identified for use of the terrestrial component of International Mobile Telecommunications (No. 5.550B).

h) that the allocation to the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high-altitude platform stations, and the use of the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions of Resolution 122 (Rev.WRC-19) (No. 5.552A);

i) that the use of the frequency bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the FSS (space-to-Earth) is limited to GSO satellites (No. 5.554A);

k) that the pfd in the frequency band 48.94-49.04 GHz produced by any GSO space station in the FSS (space-to-Earth) operating in the frequency bands 48.2-48.54 GHz and 49.44-50.2 GHz shall not exceed 151.8 dB(W/m2) in any 500 kHz band at the site of any radio astronomy station (No. 5.555B);

l) that, in the frequency bands 49.7-50.2 GHz, 50.4-50.9 GHz and 51.4-52.6 GHz, Resolution 750 (Rev.WRC-19) applies, and Nos. 5.338A, 5.340 and 5.340.1 apply among other provisions of the Radio Regulations;

m) that the fixed and mobile services are allocated on a primary basis in the frequency bands 37.5-42.5 GHz and 47.2-50.2 GHz on a global basis;

n) that
the frequency band 40.0-40.5 GHz is allocated to the SRS and the Earth exploration-satellite service (EESS) in the Earth-to-space direction on a primary basis;

o) that the frequency bands 37.5-40.5 GHz are also allocated to the EESS in the space-to-Earth direction on a secondary basis;

p) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the EESS (passive) and SRS (passive), which need to be adequately protected;

q) that all allocated services in these frequency bands shouldbe protected,

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 WRC-23 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, based on the results of ITU-R studies, possible measures to address, the use of the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service Resolution **[A10-QV FSS] (Rev.WRC-23)**;

resolves further

to activate the Conference Preparatory Meeting,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-27,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To provide from studies, possible regulatory measures for use of the 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service

resolves to invite the ITU Radiocommunication Sector

1 to study the spectrum needs and technical and operational characteristics of aeronautical and maritime ESIMs that plan to operate within GSO and non-GSO FSS allocations in the frequency bands 40-42 GHz and 48.2-50.2 GHz;

2 to study sharing and compatibility between aeronautical and maritime ESIMs operating With GSO and non-GSO FSS networks in the frequency bands 40-42 GHz and 48.2-50.2 GHz and current and planned stations of existing services allocated in these frequency bands and, where appropriate, in adjacent frequency bands, in order to ensure protection of, and not impose undue constraints on, those services;

3 to study updates for the Article 21 provisions applicable to NGSO FSS systems operating more than 100 satellites while ensuring the protection of terrestrial services (see **21.16.4**);

4 to develop, for aeronautical and maritime ESIMs, technical conditions and regulatory provisions for their operation, taking into account the results of the studies above,

invites the 2027 World Radiocommunication Conference

to consider the results of the above studies and take necessary actions, as appropriate, provided that the results of the studies referred to in resolves to invite the ITU Radiocommunication Sector are complete and agreed by the radiocommunication study groups.

Reason: Perform sharing and compatibility for a new FSS allocation in Q and V bands while also ensuring the protection of primary allocations for incumbent services.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR [XXX]

Subject: to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 40-42 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution **[QV FSS] (WRC-23)**;
Origin: United States of America

Proposal: to enable the establishment of spectrum allocation and associated regulatory provisions to support in specific frequency bands, geostationary and non-geostationary space stations in the fixed-satellite service **[QV FSS] (WRC-23)**;

Background/reason:

To provide a means for recognizing in the Radio aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service in specific frequency ranges in accordance with Resolution **[QV FSS] (WRC-23)**;

Radiocommunication services concerned:
Fixed-satellite service, Fixed Service, Mobile Service, IMT, Space Research Service, Land Mobile, Broadcasting, Broadcasting-Satellite

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue:

Studies to be carried out by: ITU-R ITU-R WP 4A as responsible group	*with the participation of:* Other relevant WPs, Administrations, Sector Members

ITU-R Study Groups concerned: SG 4, SG 5, and SG 7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Remarks

Additional IWG-3 views on WRC-27 Preliminary Agenda Items

With respect to preliminary agenda items in Resolution **812 (WRC-19)** addressing satellite issues where IWG-3 does not have a proposal, IWG-3 provides the following views:

- IWG-3 considers its previously approved 51.4-52.4 GHz proposal for an additional FSS allocation (contained in Document IWG-3/49r1/Document WAC/62) as a priority as compared to preliminary agenda item 2.3 in Resolution **812 (WRC-19)**.

- IWG-3 does not consider preliminary agenda item 2.7 in Resolution **812 (WRC-19)** a priority for WRC-27's agenda.

For reference, here are the preliminary agenda items referenced above:

2.3 to consider the allocation of all or part of the frequency band [43.5-45.5 GHz] to the fixed satellite service, in accordance with Resolution **177 (WRC-19)**;

2.7 to consider the development of regulatory provisions for non-geostationary fixed satellite system feeder links in the frequency bands 71-76 GHz (space-to-Earth and proposed new Earth-to-space) and 81-86 GHz (Earth-to-space), in accordance with Resolution **178 (WRC-19)**;

WRC-23 Agenda Item 10 – Future Agenda Items 2.4/2.5

IWG-3 members were not able to reach consensus on a proposal for WRC-23 agenda item (AI) 10 which are on the preliminary agenda for WRC-27 under 2.4 and 2.5, and, therefore, it forwards two views on how the FCC could handle this matter. The key outstanding difference is whether the studies should be focused on all incumbent terrestrial services (View A) or limited to fixed services (View B).

VIEW A

View A is supported by: CTIA

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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

Preliminary WRC-27 agenda items 2.4 and 2.5

The preliminary agenda for WRC-27 contains two preliminary agenda items (2.4 and 2.5) that propose to study the conditions of the use of the 71-76 GHz and 81-86 GHz bands by satellite services, and how to ensure the protection of incumbent in-band terrestrial service operations and adjacent passive services. This proposal combines the elements of Resolution **775** (WRC-19) and Resolution **776** (WRC-19) into a single future agenda item.

2.4 to consider the introduction of ~~power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.)~~ limits on satellite services in Article **21**, and conditions to ensure compatibility with passive services, for the use of the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC-19)**;

~~2.5 the conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution **776 (WRC-19);**~~

MOD USA/10/1

RESOLUTION 775 (REV. WRC-23~~19~~)

Sharing and compatibility between ~~stations in the fixed service and~~ satellite services and other incumbent services in, and adjacent to, the frequency bands 71-76 GHz and 81-86 GHz

The World Radiocommunication Conference (~~Sharm el-Sheikh~~Dubai, 2023~~19~~),

considering

a) that WRC-2000 made a number of different allocation changes to the frequency bands 71-76 GHz and 81-86 GHz based on the requirements known at the time;

b) that the frequency bands 71-76 GHz and 81-86 GHz are allocated on a primary basis, among other services, to the fixed and mobile services globally;

c) that the frequency band 71-76 GHz is also allocated to the fixed-satellite service (FSS) (space-to-Earth) and the mobile-satellite service (MSS) (space-to-Earth) and the frequency band 74-76 GHz is allocated to the broadcasting-satellite service;

d) that the frequency band 81-86 GHz is also allocated to the FSS and MSS (Earth-to-space);

e) that the frequency bands 76-77.5 GHz, 79-81 GHz and 81-86 GHz are allocated to the radio astronomy service (RAS) on a primary basis;

f) that the frequency band 86-92 GHz is allocated to the Earth exploration-satellite service (EESS) (passive), the space research service (SRS) (passive) and the RAS, and that No. **5.340** applies in this frequency band;

g~~e~~) that sharing conditions between the terrestrial~~fixed~~ services and satellite services in the frequency bands 71-76 GHz and 81-86 GHz could not be fully developed at WRC-2000 due to lack of available information on these services at the time;

h~~f~~) that now, nearly 20 years on, there have been a number of significant technology advances and changes in network requirements in the fixed and mobile services, and the frequency bands 71-76 GHz and 81-86 GHz have become strategically important frequency bands for high-capacity fixed-service links, including backhaul for future mobile networks;

i) that compatibility conditions between satellite services in the frequency bands 71-76 GHz and 81-86 GHz and passive services in the frequency bands and in adjacent frequency bands could not be fully developed at WRC-2000 due to lack of available information on satellite services at the time;

j~~g~~) that WRC-12 already addressed sharing and compatibility issues between the fixed service and passive services in the frequency bands 71-76 GHz and 81-86 GHz and relevant adjacent frequency bands,

k) that Resolution **750 (Rev.WRC-19)** contains no provisions to protect the EESS (passive) in the frequency band 86-92 GHz from emissions of the space services in the frequency band 81-86 GHz;

l) that Resolution **739 (Rev.WRC-19)** contains no provisions to protect the RAS in adjacent frequency bands from emissions of the space services in the frequency bands 71-76 GHz and 81-86 GHz,

recognizing

~~*a)* that there is now much more information available in the ITU Radiocommunication Sector (ITU-R) on the characteristics and deployment of fixed service systems;~~

a~~b~~) that there are an increasing number of satellite filings in the frequency bands 71-76 GHz and 81-86 GHz;

b~~e~~) that Article **21** and other provisions of the Radio Regulations currently do not contain the necessary technical and regulatory provisions to protect the ~~fixed~~ terrestrial service use in the frequency bands 71-76 GHz and 81-86 GHz;

c~~d~~) that Resolution **750 (Rev.WRC-19)** already contains necessary provisions to protect passive services in the frequency bands and adjacent frequency bands from emissions of the fixed service in the frequency bands 71-76 GHz and 81-86 GHz, and there is no intention to change these provisions;

d~~e~~) that there is no intention to change the existing allocations or status of those allocations in Article **5** of the Radio Regulations for the frequency bands 71-76 GHz and 81-86 GHz,

e) that the use of mitigation techniques could be studied as a possible solution for satellite services in the frequency band 81-86 GHz to meet the protection requirements of EESS (passive) and the SRS (passive) services in the frequency band 86-92 GHz;

f) that Recommendation ITU-R RS.2017 provides the interference criteria for satellite passive remote sensing in the band 86-92 GHz;

resolves to invite the ITU Radiocommunication Sector

1 to conduct, as a matter of urgency and in time for WRC-27, the appropriate studies to determine ~~power flux-density and equivalent isotropically radiated power~~ limits in Article **21** for satellite services to protect the current and planned terrestrial~~fixed~~ service**s** in the frequency bands 71-76 GHz and 81-86 GHz ~~without unduly constraining satellite systems~~,

~~1~~2 to conduct the appropriate studies to determine the technical conditions for satellite services in the frequency band 81-86 GHz in order to protect the EESS (passive) and the SRS (passive) in the frequency band 86-92 GHz and the RAS in the frequency bands mentioned in considering e) and f) without unduly constraining satellite systems,

invites the 2027 World Radiocommunication Conference

to consider the results of studies and take necessary action,

invites administrations

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

Reason: Modifications are proposed to combine the studies called for in Resolutions 775 and 776, as well as recognition of other incumbent services.

SUP USA/10/2

RESOLUTION 776 (WRC-19)

Conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services

Reason: Consequential action. The studies called for under Resolution 776 and now included in Resolution 775, as modified.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR [XXX]

Subject: to consider the introduction of limits on satellite services in Article **21**, and conditions to ensure compatibility with passive services, for the use of the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC-19)**;

Origin: Preliminary WRC-27 agenda items 2.4 and 2.5, as revised by the United States of America.

Proposal: to consider the introduction of limits on satellite services in Article **21**, and conditions to ensure compatibility with passive services, for the use of the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC-19)**;

Background/reason:
As interest in using the 70/80 GHz bands grows, it is necessary to establish the appropriate provisions to ensure the protection of terrestrial operations, as well as adjacent band passive services.

Radiocommunication services concerned:
Fixed-satellite service, Fixed Service, Mobile Service, Mobile-satellite Service, Broadcasting Service, Broadcasting-Satellite Service, Radio Astronomy, Earth-Exploration Satellite Service (passive), Space Research Service (passive).

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue:

Studies to be carried out by: ITU-R ITU-R WP 4A as responsible group	*with the participation of:* Other concerned WPs, Administrations, Sector Members

ITU-R Study Groups concerned: SG 3, SG4, SG 5, SG 6and SG 7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Remarks

VIEW B

View B is supported by: SpaceX

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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

Preliminary WRC-27 agenda items 2.4 and 2.5

The preliminary agenda for WRC-27 contains two preliminary agenda items (2.4 and 2.5) that propose to study the conditions of the use of the 71-76 GHz and 81-86 GHz bands by satellite services, and how to ensure ~~the protection~~sharing ~~of~~ between satellite services and ~~incumbent~~ in-band ~~terrestrial~~ fixed service operations and compatibility between satellite services and adjacent passive services. This proposal combines the elements of Resolution **775** (WRC-19) and Resolution **776** (WRC-19) into a single future agenda item.

2.4 to consider sharing between ~~the introduction of power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits on~~ satellite services and fixed service ~~in Article **21**~~, in the ~~and conditions to ensure compatibility with passive services, for the use of~~ the frequency bands 71-76 GHz and 81-86 GHz and compatibility between satellite services and adjacent passive services in accordance with Resolution **775 (WRC-19)**;

~~2.5 the conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution **776 (WRC-19);**~~

MOD USA/10/1

RESOLUTION 775 (REV. WRC-23~~19~~)

Sharing ~~and compatibility~~ between ~~stations in the fixed service and~~ satellite services ~~and the fixed service~~~~other incumbent services~~ in~~, and adjacent to,~~ the frequency bands 71-76 GHz and 81-86 GHz and compatibility between satellite services and adjacent passive services

The World Radiocommunication Conference (~~Sharm el-Sheikh~~Dubai, 2023~~19~~),

considering

a) that WRC-2000 made a number of different allocation changes to the frequency bands 71-76 GHz and 81-86 GHz based on the requirements known at the time;

b) that the frequency bands 71-76 GHz and 81-86 GHz are allocated on a primary basis, among other services, to the fixed and mobile services globally;

c) that the frequency band 71-76 GHz is also allocated to the fixed-satellite service (FSS) (space-to-Earth) and the mobile-satellite service (MSS) (space-to-Earth) on a primary basis and the frequency band 74-76 GHz is allocated to the broadcasting-satellite service (BSS), and that **No. 5.561** affords FSS and BSS protection in the 74-76 GHz frequency band;

d) that the frequency band 81-86 GHz is also allocated to the FSS and MSS (Earth-to-space) on a primary basis;

e) that the frequency bands 76-77.5 GHz, 79-81 GHz and 81-86 GHz are allocated to the radio astronomy service (RAS) on a primary basis;

f) that the frequency band 86-92 GHz is allocated to the Earth exploration-satellite service (EESS) (passive), the space research service (SRS) (passive) and the RAS, and that No. **5.340** applies in this frequency band;

g~~e~~) that sharing conditions between the fixed services and satellite services in the frequency bands 71-76 GHz and 81-86 GHz could not be fully developed at WRC-2000 due to lack of available information on these services at the time;

h~~f~~) that now, nearly 20 years on, there have been a number of significant technology advances and changes in network requirements in the co-primary fixed and satellite services, and the frequency bands 71-76 GHz and 81-86 GHz have become strategically important frequency bands for high-capacity ~~fixed service~~ links for both services, including for satellite earth stations and backhaul for future mobile networks;

i) that compatibility conditions between satellite services in the frequency bands 71-76 GHz and 81-86 GHz and passive services in the frequency bands and in adjacent frequency bands could not be fully developed at WRC-2000 due to lack of available information on satellite services at the time;

j~~g~~) that WRC-12 already addressed sharing and compatibility issues between the fixed service and passive services in the frequency bands 71-76 GHz and 81-86 GHz and relevant adjacent frequency bands,

k) that Resolution **750 (Rev.WRC-19)** contains no provisions to protect the EESS (passive) in the frequency band 86-92 GHz from emissions of the space services in the frequency band 81-86 GHz;

l) that Radio Astronomy is primary in the 81-86 GHz bands and that Resolution **739 (Rev.WRC-19)** contains no provisions to protect the RAS in adjacent frequency bands from emissions of the space services in the frequency bands 71-76 GHz and 81-86 GHz,

recognizing

a) that there is now much more information available in the ITU Radiocommunication Sector (ITU-R) on the characteristics and deployment of fixed-service systems;

a~~b~~) that there are an increasing number of satellite filings in the frequency bands 71-76 GHz and 81-86 GHz;

b~~e~~) that Article **21** and other provisions of the Radio Regulations currently do not contain the necessary technical and regulatory provisions to protect the ~~fixed~~fixed-~~terrestrial~~ service use in the frequency bands 71-76 GHz and 81-86 GHz;

c~~d~~) that Resolution **750 (Rev.WRC-19)** already contains necessary provisions to protect passive services in the frequency bands and adjacent frequency bands from emissions of the fixed service in the frequency bands 71-76 GHz and 81-86 GHz, and there is no intention to change these provisions;

d~~e~~) that there is no intention to change the existing allocations or status of those allocations in Article **5** of the Radio Regulations for the frequency bands 71-76 GHz and 81-86 GHz,

e) that the use of mitigation techniques could be studied as a possible solution for satellite services in the frequency band 81-86 GHz to meet the protection requirements of EESS (passive) and the SRS (passive) services in the frequency band 86-92 GHz;
f) that Recommendation ITU-R RS.2017 provides the interference criteria for satellite passive remote sensing in the band 86-92 GHz;

resolves to invite the ITU Radiocommunication Sector

3 to conduct, as a matter of urgency and in time for WRC-27, the appropriate studies to determine sharing conditions between ~~power flux-density and equivalent isotropically radiated power limits in Article **21** for~~ satellite services and the fixed to ~~protect the current and planned terrestrial~~fixed service~~s~~ in the frequency bands 71-76 GHz and 81-86 GHz,

~~2~~4 to conduct the appropriate studies to determine the technical conditions for satellite services in the frequency band 81-86 GHz in order to protect the EESS (passive) and the SRS (passive) in the frequency band 86-92 GHz and the RAS in the frequency bands mentioned in considering e) and f)

invites the 2027 World Radiocommunication Conference

to consider the results of studies and take necessary action,

invites administrations

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

Reason: Modifications are proposed to combine the studies called for in Resolutions 775 and 776, as well as recognition of other incumbent services.

SUP USA/10/2

RESOLUTION 776 (WRC-19)

Conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services

Reason: Consequential action. The studies called for under Resolution 776 and now included in Resolution 775, as modified.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR [XXX]

Subject: to consider sharing betweenthe introduction of limits on satellite services and the fixed service in the in Article **21**, and conditions to ensure compatibility with passive services, for the use of the frequency bands 71-76 GHz and 81-86 GHz and compatibility between satellite services and adjacent passive services in accordance with Resolution **775 (WRC-19)**;

Origin: Preliminary WRC-27 agenda items 2.4 and 2.5, as revised by the United States of America.

Proposal: to consider sharing betweenthe introduction of limits on satellite services and the fixed service inin Article **21**, and conditions to ensure compatibility with passive services, for the use of the frequency bands 71-76 GHz and 81-86 GHz and compatibility between satellite services and adjacent passive service in accordance with Resolution **775 (WRC-19)**;

Background/reason:
As interest in using the 70/80 GHz bands grows, it is necessary to establish the appropriate provisions to ensure sharing between satellite services and fixed service and compatibility between satellite services and adjacent passive servicesthe protection of terrestrial operations, as well as adjacent band passive services.

Radiocommunication services concerned:
Fixed-satellite service, Fixed Service, Mobile Service, Mobile-satellite Service, Broadcasting Service, Broadcasting-Satellite Service, Radio Astronomy, Earth-Exploration Satellite Service (passive), Space Research Service (passive).

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue:

Studies to be carried out by: ITU-R ITU-R WP 4A as responsible group	*with the participation of:* Other concerned WPs, Administrations, Sector Members

ITU-R Study Groups concerned: SG 3, SG4, SG 5, SG 6and SG 7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Remarks

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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

Preliminary WRC-27 agenda item 2.6

The preliminary agenda for WRC-27 contains preliminary agenda item 2.6 that considers the development of regulatory provisions for appropriate recognition of space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies reported to WRC-23 under agenda item 9.1 and its corresponding Resolution **657 (Rev.WRC-19)**.

The United States recognizes that space weather observations from ground-based and space-based systems are becoming more and more important, in particular for the detection of solar activity events that can harmfully affect national economies, human welfare, and national security. Some of the sensors, both ground-based and space-based, make precise measurements that may be vulnerable to interference and noise from systems emitting radio signals with frequencies and associated bandwidths at or adjacent to those used by the sensors. However, Resolution **657 (Rev.WRC-19)** lacks specificity on frequency bands and applicable radio services to support addressing this important topic. The United States also recognizes that additional studies related to space weather sensors can be supported through the development of ITU-R Reports and Recommendations without Resolution **657 (Rev.WRC-19)**. For example, the ITU-R has developed/is developing the following documents related to this topic:

- Report RS.2456 “Space weather sensor systems using radio spectrum”
- Report RS.2489 “Technical and operational characteristics of ground-based passive sensors operating in the 51-58 GHz frequency range.”
- Working Document towards a New Report on “Spectrum use and applicable radio service designations for receive only space weather sensors that provide data used for predictions and warnings.”
- Working Document towards a New Report on “Interference criteria for receive-only space weather sensors”
- Working Document towards a New Report on “Spectrum requirements and applicable radio service designations for active space weather sensors that provide data critical for predictions and warnings”

In addition, the United States may wish to advocate for a new ITU-R Resolution at RA-23 to recognize the use of space weather sensors and establish an ITU database where administrations can share the location and frequency of operations. As the interest and the importance of data from space weather monitoring systems is growing, the United States supports further discussions on the appropriate regulatory recognition of these systems.

Without the minimum elements needed for regulatory studies in a modification of Resolution **657 (Rev.WRC-19)**, it could be suppressed.

Proposals

SUP USA/10/1

RESOLUTION 657 (REV.WRC-19)

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

Reason: Resolution **657 (Rev.WRC-19)** currently lacks specificity for continued studies with respect to identifying the application radio service, candidate frequency bands, and studies towards regulatory provisions. Future considerations on this topic could be aided by improved focus on the type of sensor (ground-based or space-based), candidate frequency band(s), and applicable radio service when considering any possible regulatory action and/or consideration of a future agenda item.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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.

Introduction

WRC-19 agenda item 10 recommends to Council items to include in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible items for future conferences, under Article 7 of the Convention.

In this proposal the United States affirms its support for including agenda item 2.8 of Resolution 812 (WRC-19) on the agenda for the 2017World Radiocommunication Conference, for the frequency bands placed in square brackets by WRC-19.

Background

Resolution 812 (WRC-19), agenda item 2.8 provides:

> 2.8 to study the technical and operational matters, and regulatory provisions, for space-to-space links in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 610-1 645.5 MHz], [1 646.5-1 660.5 MHz] and [2 483.5-2 500 MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service, in accordance with Resolution 249 (WRC-19);

Proposal

The United States proposes to include Preliminary agenda Item 2.8 on the agenda for the 2017 World Radiocommunication Conference in accordance with the attached revised resolution.

ADD USA/AI[AA]/1

RESOLUTION 249 (rev. WRC-23)

Study of technical and operational issues and regulatory provisions for space-to-space transmissions in the Earth-to-space direction in the frequency bands ┤1 610-1 645.5 and 1 646.5-1 660.5 MHz├ and the space-to-Earth direction in the frequency bands ┤1 525-1 544 MHz├, ┤1 545-1 559 MHz├, ┤1 613.8-1 626.5 MHz├ and ┤2 483.5-2 500 MHz├ among non-geostationary and geostationary satellites operating in the mobile-satellite service*

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

considering

a) that the definition of mobile-satellite service (MSS) in No. **1.25** includes communication between space stations;

b) that the definition of inter-satellite service (ISS) in No. **1.22** includes only links between space stations, and that the term *inter-satellite link* in this resolution is taken to mean radiocommunication service link between artificial satellites;

c) that many non-geostationary-satellite orbit (non-GSO) satellites operate with limited and non-real-time connectivity to earth stations;

d) that space-to-space communication between such non-GSO satellites and geostationary satellite orbit (GSO) MSS satellites would enhance the security and efficiency of operations;

e) that MSS satellites operating in the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660.5 MHz and 2 483.5-2 500 MHz can support these types of operation;

f) that using the frequency bands 1 610-1 645.5 MHz and 1 646.5-1 660.5 MHz allocated to the MSS (Earth-to-space) for transmissions in the Earth-to-space direction from non-GSO MSS space stations towards MSS space stations operating at higher orbital altitudes, including GSO, may increase spectral efficiency in these frequency bands;

g) that using the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 613.8-1 626.5 MHz and 2 483.5-2 500 MHz allocated to the MSS (space-to-Earth) for transmissions in the space-to-Earth direction from MSS space stations operating at higher orbital altitudes, including GSO, towards non-GSO MSS satellites, may increase spectral efficiency in these frequency bands;

h) that all MSS allocations in the above frequency bands include a space-to-Earth or Earth-to-space direction indicator, but do not include a space-to-space direction indicator;

i) that the ITU Radiocommunication Sector (ITU-R) has begun preliminary studies on the technical and operational issues associated with the operation of space-to-space links between non-GSO MSS satellites and GSO MSS satellites in the above frequency bands, but no studies have been conducted on the technical and operational issues associated with the operation of space-to-space links between non-GSO MSS satellites and non-GSO MSS satellites in the above frequency bands;

j) that it is technically feasible for a lower orbital altitude non-GSO space station to transmit data to and receive data from a higher orbital altitude non-GSO or GSO space station when passing within the satellite antenna coverage beam that is directed towards the Earth;

k) that several satellite systems have been relying on satellite-to-satellite communication in existing satellite frequency bands under No. **4.4**, and such reliance on No. **4.4** does not provide a sound basis for

continued development of such systems nor the confidence in commercial viability and availability of the service to the end users;

l) that there is growing interest for utilizing space-to-space satellite links for a variety of applications;

m) that a precedent for space-to-space links sharing with Earth-to-space and space-to-Earth exists for the space operation, Earth exploration-satellite and space research services in the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz through the inclusion of a space-to-space allocation,

recognizing

a) that it is necessary to study the impact on other services, as well as Earth-to-space and space-to-Earth operation within the MSS , of the operation of inter-satellite links in the above frequency bands, taking into account applicable footnotes to the Table of Frequency Allocations, to ensure compatibility with all primary allocated services in these frequency bands and the adjacent frequency bands and avoid harmful interference;

b) that there should be no additional regulatory or technical constraints imposed on primary services to which the frequency band and adjacent frequency bands are currently allocated;

c) that it is necessary to study whether space-to-Earth direction transmissions from space stations at higher orbital altitudes, including GSO, can be successfully received by lower orbital altitude non-GSO satellites, without imposing any additional constraints on all allocated services in these frequency bands;

d) that the sharing scenarios may vary widely because of the wide variety of orbital characteristics of the non-GSO MSS space stations;

e) that out-of-band emissions, signals due to antenna pattern sidelobes, reflections from receiving space stations and in-band unintentional radiation due to Doppler shifts may impact services operating in the same and adjacent or nearby frequency bands;

f) that currently the only option for MSS space stations in the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646-1 660.5 MHz and 2 483.5-2 500 MHz needing to communicate with other orbital space stations is to operate under No. **4.4**, without recognition and on a non-harmful interference/non-protected basis in frequency bands allocated to another space service,

recognizing further

a) that the use of frequency bands by the MSS in the frequency range 1-3 GHz is subject to existing Resolutions, coordination requirements and country footnotes taking into account, in particular, the protection of safety services and aeronautical mobile-satellite (R) services, and of the Global Maritime Distress and Safety System;

b) that the fixed and mobile services are allocated on a primary basis in the frequency band 2 483.5-2 500 MHz on a global basis and that the fixed service is also allocated on a primary basis in the frequency band 1 525-1 530 MHz in Regions 1 and 3;

c) that the radionavigation-satellite service is allocated on a primary basis in the frequency band 1 559-1 610 MHz for both space-to-Earth and space-to-space use;

noting

a) that section 3.1.3.2 of the Director's Report to this conference highlights that the Radiocommunication Bureau has received an increased number of Advance Publication Information (API) submissions for non-GSO networks in frequency bands which are not allocated by Article **5** for the type of service foreseen, including satellite network filings for inter-satellite applications in frequency bands allocated only in the Earth-to-space or space-to-Earth directions;

b) that the Director's Report concludes that, in view of recent technical developments and the increasing number of submissions of inter-satellite links in frequency bands not allocated to the ISS or to a space service in the space-to-space direction, this conference may wish to consider means to give recognition to these uses based on the conditions derived from studies by ITU-R Working Parties 4A and 4C in order to avoid interfering with existing systems operating in the same frequency bands,

resolves to invite the ITU Radiocommunication Sector

1 to study the technical and operational characteristics of different types of non-GSO MSS space stations that operate or plan to operate space-to-space links with GSO MSS networks in the following frequency bands:

a) Earth-to-space direction in the frequency bands [1 626.5-1 645 5 MHz and 1 646.5- 1 660.5 MHz]; and

b) space-to-Earth direction in the frequency bands [1 525-1 544 MHz and 1 545-1 559 MHz];

2 to study the technical and operational characteristics of different types of non-GSO MSS space stations that operate or plan to operate space-to-space links with non-GSO and GSO MSS networks in the following frequency bands:

a) Earth-to-space direction in the frequency band [1 610-1 626.5 MHz]; and

b) space-to-Earth direction in the frequency bands [1 613.8-1 626.5 MHz and 2 483.5-2 500 MHz];

3 to study sharing and compatibility between space-to-space links in the cases described in *resolves to invite the ITU Radiocommunication Sector* 1 and 2 and

– current and planned stations of the MSS ;

– other existing services allocated in the same frequency bands; and

– other existing services allocated in adjacent frequency bands,

in order to ensure protection of, and not impose undue constraints on, other MSS operations and other services allocated in those frequency bands and in adjacent frequency bands, taking into account *recognizing further a)* to *c)*;

4 to develop technical conditions and regulatory provisions for the operation of space-to-space links in these frequency bands, including new or revised MSS allocations or the addition of ISS allocations, on a secondary basis, while ensuring the protection of, and without imposing additional constraints on, other MSS operations or services allocated in those and adjacent frequency bands, taking into account the results of the studies called for in *resolves to invite the ITU Radiocommunication Sector* 1, 2, and 3 above;

5 to complete these studies by WRC-27,

invites administrations

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

invites the 2027 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate

View of IWG-3 on NTIA/RCS Proposal for Agenda Item 10

At its 21th meeting on March 21, 2023, IWG-3 considered the NTIA/RCS proposal in Document IWG-3/87 to add a WRC-27 agenda item for the study of satellite-to-satellite links in certain frequency bands allocated to the mobile-satellite service. IWG-3 notes that its 21st meeting approved Document IWG-3/59 seeking to add the same WRC-27 agenda item,

IWG-3 did not develop a view on the satellite-to-satellite link proposal in Document IWG-3/87. However, members did express their consent to leave the reconciliation of the proposals in Documents IWG-3/59 and IWG-3/87 to the FCC-NTIA WRC proposal reconciliation process. Further, a member highlighted the following items in Document IWG-3/87 for consideration by the FCC:

- *considering d)* of proposed Resolution 249: whether the term "instrument data" should be generalized to "data;"
- proponent operators of MSS systems that may host space-to-space links contemplate these operations on a secondary basis; in Document IWG-3/87, NTIA/RCS contemplate primary operations.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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

Study of technical and operational issues and regulatory provisions for adding inter-satellite service allocation in the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) for non-GSO user space stations operating at lower orbital altitudes, in communication with GSO satellites in the fixed-satellite service

Background

The development of satellite data relay applications using the satellite services has shown tremendous progress in the last 4 years, and initial market analysis shows no indication of slowing down in the near future. Commercial satellite operators are underway with designing and testing these data relay systems which will be beneficial to many end users, who operate low earth orbiting (LEO) satellites with limitations on the capability of getting the data to a earth station in a timely manner, to ensure that the data remains valuable. As a part of the satellite data relay landscape, C-band offers unique opportunity in contact time and coverage with the LEO user space station. One application is for urgent/real-time tasking of data relay services to the end user.

This proposal seeks to study the sharing and compatibility of adding inter-satellite service allocation in the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) for non-GSO user space stations operating at lower orbital altitudes, in communication with GSO satellites in the fixed-satellite service.

IWG-3 was able to reach consensus on a single view which allows for the US to consider adoption of this future agenda item.

ADD USA/10 (CBAND_ISS)/1

DRAFT NEW RESOLUTION [AI 10] (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 WRC-27;

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 WRC-23 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:

2 to consider, based on the results of ITU-R studies, possible measures to address, adding an inter-satellite service allocation in the frequency bands 3 700 - 4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) for non-GSO space stations operating at lower orbital altitudes, in communication with GSO satellites in the fixed-satellite service Resolution **[CBAND_ISS] (Rev.WRC-23)**;

resolves further

to activate the Conference Preparatory Meeting,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-27,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To provide for studies, possible regulatory measures for an inter-satellite service allocation in the frequency bands 3 700 - 4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) for non-GSO space stations operating at lower orbital altitudes, in communication with GSO satellites in the fixed-satellite service;

ADD USA/10 (CBAND_ISS)/2

RESOLUTION [AI10 ISL] (WRC-23)

Study of technical and operational issues and regulatory provisions for adding inter-satellite service allocation in the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) for non-GSO user space stations operating at lower orbital altitudes, in communication with GSO satellites in the fixed-satellite service

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that many non-geostationary-satellite orbit (non-GSO) satellites operate with limited and non-real-time connectivity to earth stations;

b) that space-to-space communication between such non-GSO satellites and geostationary satellite orbit FSS satellites would enhance the efficiency of operations and that the effective re-use of some frequency bands allocated to the FSS for transmissions between space stations may increase spectral efficiency in those frequency bands;

c) that the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) allocated to the FSS are used for links between earth stations and space stations;

d) that there is growing interest for utilizing satellite-to-satellite links for a variety of applications and that there have been expressions of interest by some administrations in using the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz for inter-satellite service transmissions between space stations in those frequency bands;

e) that it is technically feasible for a lower orbital altitude non-GSO space station to transmit data to and receive data from a higher orbital altitude GSO space station when passing within the satellite antenna coverage beam that is directed towards the Earth;

f) that sharing and compatibility studies were performed between satellite-to-satellite links intending to operate between space stations in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and current and planned stations of the FSS and other existing services allocated in same frequency bands and adjacent frequency bands, including passive services, with a view to ensuring protection of the primary services,

recognizing

a) that it is necessary to study the impact to primary services, taking into account applicable footnotes to the Table of Frequency Allocations, through sharing and compatibility studies, the protection of primary allocated services in the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) and adjacent bands;

b) that there should be no additional regulatory or technical constraints imposed on incumbent services to which the frequency band and adjacent frequency bands are currently allocated;

c) that it is necessary to study whether space-to-Earth direction transmissions from GSO space stations can be successfully received by lower orbital altitude non-GSO satellites, without imposing any additional constraints on all allocated services in these frequency bands;

d) that the sharing scenarios may vary because of the wide variety of orbital characteristics of the non-GSO FSS space stations;

e) that out-of-band emissions, signals due to antenna pattern sidelobes, reflections from receiving space stations and in-band unintentional radiation due to Doppler shifts may impact services operating in the same and adjacent or nearby frequency bands;

recognizing further

a) that the use of frequency bands by the FSS in the frequency ranges 3 700-4 200 MHz and 5 925-6 425 MHz is subject to existing Resolutions, coordination requirements and country footnotes taking into account, in particular, the protection of primary incumbent services;

b) that the 3700 – 4200 MHz band is allocated to the Fixed and Mobile service on a primary basis in Regions 2 and 3,

c)* that in Region 1, the 3700 – 4200 MHz band is allocated to the fixed service on a primary basis, [the 3700 – 3800 MHz band is allocated to the mobile service on a primary basis]

d) that the 3700 – 3800 MHz band is identified in Region 2 via No. 5.IMT;

e) that any future use of ISS in the 3700 – 4200 MHz band shall not claim protection from terrestrial services operating in accordance with the Radio Regulations;

f) that the FSS, fixed and mobile services are allocated globally on a co-primary basis in the frequency band 5 925- 6 425 MHz;

g) that the use of the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz by the non-GSO FSS is subject to the application of the provisions 22.5C and 22.5D;

g) that the frequency bands 5 925-6 425 MHz may be used for the FSS (Earth-to-space) for the provision of earth stations located on board vessels subject to No. **5.457A** and **5.457B;**

i) that the use of the frequency bands 5 925-6 425 MHz by aeronautical mobile telemetry is subject to the application of the provisions of No. **5.457C**,

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*This Region 1 allocation for FS/MS is pending the WRC-23 outcome, and this recognizing further should be revised or removed based on the conclusion of AI 1.2/1.3

resolves to invite the ITU Radiocommunication Sector

1 to study the technical and operational characteristics of different types of non-GSO space stations that operate or plan to operate space-to-space links with GSO FSS networks in the following frequency bands:

a) Earth-to-space direction in the frequency bands 5 925-6 425 MHz, for transmissions from non-GSO user space stations operating at lower orbital altitudes in communication with GSO service provider space stations in the fixed-satellite service; and

b) space-to-Earth direction in the frequency bands 3 700-4 200 MHz, for transmissions from FSS GSO service provider space stations, towards non-GSO user space stations;

2 to study sharing and compatibility between inter-satellite service space-to-space links in the cases described in *resolves to invite the ITU Radiocommunication Sector* 1 and

– current and planned stations of the FSS;

– other existing services allocated in the same frequency bands; and

– other existing services allocated in adjacent frequency bands,

in order to ensure protection of, and not impose undue constraints on, other services allocated in those frequency bands and in adjacent frequency bands, taking into account *recognizing further a)* to i*)*;

3 to develop technical conditions and regulatory provisions for the operation of ISS links in these frequency bands, taking into account the results of the studies called for in *resolves to invite the ITU Radiocommunication Sector* 1 and 2 above;

4 to complete these studies by WRC-27,

invites administrations

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

invites the 2027 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR [CBAND_ISS]

Subject: Proposed WRC-2027 future agenda item to consider, based on the results of ITU-R studies, a primary ISS spectrum allocation and associated regulatory provisions an inter-satellite service allocation in the frequency bands 3 700 - 4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) for non-GSO space stations operating at lower orbital altitudes, in communication with GSO satellites in the fixed-satellite service Resolution **[CBAND_ISS] (WRC-23)**;

Origin: United States of America

Proposal*:* to enable the establishment of a primary spectrum allocation and associated regulatory provisions to support in the frequency bands 3 700 - 4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space), intersatellite links; in accordance with Resolution **[CBAND_ISS] (WRC-23);**

Background/reason:
Satellite data relay services continue to be a growing market for satellite operators and C-band can offer near real time, urgent request tasking as part of the larger system of satellite data relays in higher frequency bands. To provide a means for recognizing in the Radio Regulations transmissions for an intersatellite links allocation in the frequency bands 3 700 - 4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) in accordance with Resolution **[CBAND_ISS] (WRC-23)**;

Radiocommunication services concerned:
Inter satellite service, Fixed-satellite service, Fixed Service, Mobile Service

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Studies have been initiated in Working Party 4A during the 2019-2023 ITU-R Study Cycle on space-to-space satellite links in Ku and Ka band.

Studies to be carried out by: ITU-R Study Group 4 WP4A	*with the participation of:* SGs 5 WP5A, 5B, 5C, 5D

ITU-R Study Groups concerned: SG 4, and SG 5

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Remarks

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

The attached document was progressed in IWG-3, including through several offlines, but IWG-3 ran out of time to conclude on discussions (or develop views) on the draft proposal contained herein. The proposal, which seeks to study additional frequency bands for mobile satellite service operations, would benefit from further development in subsequent discussions in the U.S. CITEL/WRC preparatory processes.

The following WAC members present during the 03/21/2023 IWG-3 meeting AT&T, Boeing, CTIA, GSMA, Intelsat, Microsoft, Motorola Solutions, Inc., NCTA, Planet, T-Mobile, and Verizon expressed concerns with the current draft version of the document due to the candidate frequency bands, necessity to develop appropriate recognition of incumbent uses and/or other topics. This item is being sent to the WAC on a non-consensus basis.

Author: Iridium
Echostar

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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.

Introduction

This is a proposal for a new agenda item for WRC-27 to direct the ITU-R to begin studies of potential frequency bands for new mobile-satellite service allocations with a view to WRC-30 adopting new allocations and attendant regulatory mechanisms.

Background/Discussion

The demand for mobile satellite applications is rapidly increasing, and estimates show that this demand will continue to grow in the future. However, there is a persistent spectrum shortfall in the lower bands, which is crowding the available spectrum and limiting the growth of MSS. This shortfall can only be addressed by allocating more MSS spectrum to accommodate future MSS requirements.

There are several demand drivers for MSS, including the increased demand for mobility in satellite services (evidenced by recent WRC actions to increasing mobility in the fixed-satellite service), the need for more capacity to expand services (existing and new), and the sorely needed coverage of underserved and remote areas. The bandwidth required to accommodate evolving technologies such as IoT, DTD, and broadband applications, as well as emergency and disaster response, also highlights the need for additional MSS spectrum.

The emergence of Direct-to-Device integration of MSS capability into existing cellular chipsets will drive significant demand growth. Moreover, satellite IoT continues to experience significant growth, reflecting the evolution of the IoT ecosystem. In addition, there is an opportunity to extend 5G/IMT capabilities to rural and other underserved communities, which can only be achieved by ensuring adequate MSS spectrum is available.

The most recent MSS allocations were made in 1995, and since then, MSS systems have significantly developed, particularly in the area of always-on broadband data communications. It is therefore essential to examine frequency bands for possible new MSS allocations.

Notably, the ongoing efforts of the 3GPP to develop NTN standards demonstrate the importance of MSS in meeting the increasing demand for mobile satellite applications. Additionally, the Federal Communications Commission's through its recent draft NPRM In the Matter of Single Network Future: Supplemental Coverage GN Docket No. 23-65 acknowledges the role of MSS assets in addressing the coverage gaps and capacity constraints faced by existing terrestrial networks.

Allocating more MSS spectrum is necessary to address the increasing demand for mobile satellite applications (and satellite mobility generally), a persistent MSS spectrum shortfall, and crowding in lower bands. MSS can provide coverage to underserved and remote areas, support evolving technologies, and facilitate the integration of satellite and terrestrial networks. Therefore, it is essential to examine frequency bands for possible new MSS allocations, taking into account evolving technology, the ongoing efforts of the 3GPP and the FCC's recognition of the importance of MSS in meeting the coverage and capacity requirements of future networks.

Proposal

The United States proposes to consider, based on the results of sharing and compatibility studies, and the protection of existing services, new allocations to the MSS in the following frequency bands:

Frequency band/Range	Transmission Direction	Notes
1427-1432 MHz	TBD	
2010-2025 MHz	Space-to-Earth	Add for R1 and R3
[2120-2160 MHz]	Earth-to-Space	Add R1 and R3, upgrade R2
2160-2170 MHz	Earth-to-Space	Add for R1 and R3
[3.8-4.2 GHz]	Space-to-Earth	
[5.925-6.425 GHz]	Earth-to-space	
[7.25-7.75 GHz]	Space-to-Earth	
[7.9-8.4 GHz]	Earth-to-Space]	

Preliminary agenda for the 2027 World Radiocommunication Conference

ADD USA/10 (MSS SPECT)/1

RESOLUTION [A10 MSS.SPECT] (WRC-23)

Additional Frequency Allocations to The Mobile-Satellite Service in the Frequency Bands 1427-1432 MHz, 2010-2025 MHz (Regions 1 and 3), 2120-2160 MHz, 2160-2170 MHz (Regions 1 and 3) and 3.8-4.2 GHz, 5.925-6.425 GHz, 7.25-7.75 GHz, 7.9-8.4 GHz

Agenda for the 2027 World Radiocommunication Conference

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that ITU-R has studied the spectrum requirements for the satellite component of International Mobile Telecommunications (IMT) for the period 2010-2020, and the results are contained in Report ITU-R M.2077;

b) that the results in Report ITU-R M.2077 indicate a shortfall of spectrum available for the satellite component of IMT in the Earth-to-space direction of between 19 MHz and 90 MHz by the year 2020;

c) that the results in Report ITU-R M.2077 indicate a shortfall of spectrum available for the satellite component of IMT in the space-to-Earth direction of between 144 MHz and 257 MHz by the year 2020;

d) that ITU-R has also studied the spectrum requirements for MSS broadband applications by the year 2020, and the results are contained in Report ITU-R M.2218;

e) that the results in Report ITU-R M.2218 indicate a shortfall of spectrum for MSS broadband applications of between 240 MHz and 335 MHz by the year 2020 in both the space to-Earth and Earth-to-space directions,

f) that MSS systems which are not part of the satellite component of IMT also require additional spectrum,

recognizing

a) that mobile-satellite systems deployed over the past three decades have been maturing, developing new technologies and growing their traffic to the point of reaching spectrum congestion, making it difficult to sustain their existing services on long term basis;

b) that mobile satellite systems implementing various applications, including broadband applications, to the communities in remote and underserved areas require additional spectrum;

c) that there is a natural migration of technology to develop smart phones with the capability of accessing mobile satellite systems, resulting in unexpected growth in new traffic demand;

d) that no new allocations have been made for the mobile-satellite service to provide general mobile satellite services since WRC-95, and therefore the shortfall of spectrum for Mobile satellite applications still needs to be addressed,

e) that the frequency ranges 1427-1432 MHz, 2010-2025 MHz (Regions 1 and 3), 2120-2160 MHz, 2160-2170 MHz (Regions 1 and 3) and 3.8-4.2 GHz, 5.925-6.425 GHz, 7.25-7.75 GHz, 7.9-8.4 GHz include allocations to other services;

resolves to invite the ITU Radiocommunication Sector

1 to complete, for WRC-27, t studies of possible bands for new allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, taking into account sharing, compatibility, and protection of existing allocations in the referenced bands.

invites the 2027 World Radiocommunication Conference

to determine, on the basis of the studies conducted under *resolves to invite the ITU Radiocommunication Sector* above, appropriate allocations to the MSS and associated regulatory actions while ensuring the protection of existing primary services in the identified frequency bands, without unnecessarily hindering their future development,

invites administrations

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

WRC-23 Agenda Item 10

Future Agenda Item proposal to review and update

IWG-3 members were not able to reach consensus on a draft U.S. proposal for WRC-23 Agenda Item 10 that seeks to review and update regulatory provisions for protection of GSO networks from non GSO systems in the parts of 14/11 GHz and 30/20 GHz frequency bands in which Article **22** epfd limits apply. This document provides two views on this matter.

View A is supported by: Amazon, SpaceX and Mangata Networks

Consistent with Plenipot Resolution **219 (Bucharest, 2022),** View A recommends that the U.S. adopt a proposal to support a future WRC agenda item that would review and update regulatory provisions for sharing between non GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which Article **22** epfd limits apply under WRC-23 Agenda Item 10.

View B is supported by: Echostar, Intelsat and Viasat

View B proponents do not support a FAI to review the long standing EPFD limits in the 14/11 GHz and 30/20 GHz frequency bands to protect GSO networks in Article **22** of the RR.

VIEW A

View A:

Agenda Item 10, FAI

Reference: IWG-4/039 (13.12.2022)

Supported by Amazon, SpaceX

View A recommends that the U.S. adopt a proposal to support a future WRC agenda item that would review and update regulatory provisions for sharing between non GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which Article **22** epfd limits apply. Non-geostationary-satellite ("non-GSO") systems in the Ka- and Ku-bands have developed into a critically important tool for connectivity across the globe. Article **22** of the Radio Regulations (RR) and Resolution 76 (Rev. WRC-15) contains provisions that aim, in principle, to ensure the compatibility of non-GSO FSS operations with GSO networks in the 14/11 GHz and 30/20 GHz frequency bands. The Article **22** epfd limits were developed nearly 25 years ago during the WRC-97 and WRC-2000 study cycles. NGSO systems and GSO networks today are vastly different in design and operational capabilities than the systems that were considered when developing the Article 22 epfd limits nearly twenty-five years ago.

The Article 22 epfd limits in the 14/11 GHz and 30/20 GHz are spectrally inefficient and create numerous regulatory issues for administrations as demonstrated under work lead by the US under WRC-19 AI 1.6. The output of these studies demonstrating the inefficiency of the EPFD framework included in ITU-R Report S.2462-0 (07/2019). The outcome of WRC-19 AI 1.16 was an entirely new EPFD framework included in No. **22.5L** and No. **22.5M** of the radio regulations. Equally important, the epfd limits were developed without taking into account long-term GSO protection criteria, and thereby overestimating GSO protections. Considering the fact that the ITU framework does not result in spectrally efficient operation of modern satellite networks in the assumptions that led to the aggregate epfd limits to protect GSO networks, and from there, to the derivation of the single-entry limits, it is clear that the time has come to revisit the values of those limits. The goal is to achieve a more efficient and rational balancing of the equities between GSO and non-GSO operations while respecting the regulatory regime.

View A is consistent with Plenipot Resolution **219 (Bucharest, 2022)**, which recognizes the need to review technologies used in GSO networks and calls for ITU-R studies "on the issue of the increasing use of radio-frequency spectrum and associated orbit resources in non-GSO orbits and the long-term sustainability of these resources, as well as on equitable access to, and rational and compatible use of, the GSO and non-GSO orbit and spectrum resources."

The organizations and companies listed above urge FCC to adopt the attached draft proposal for WRC-23 Agenda Item 10 proposal for a future agenda item that aims .

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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

WRC-27 agenda item to review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which No. 22 epfd limits apply

Background

Non-geostationary-satellite ("non-GSO") systems in the Ka- and Ku-bands have developed into a critically important tool for connectivity across the globe. They are capable of providing high speed, low latency broadband connectivity worldwide, including to locations where access to the internet was previously unreliable, or entirely unavailable. Publicly available data shows that non-GSO fixed-satellite service ("FSS") systems serve well over one million users worldwide as of 2022 and are projected to serve at least tens of millions of users by 2030, resulting in enormous benefits to the global community. These unprecedented developments have dramatically changed the paradigm in satellite telecommunications.

NGSO systems rely entirely on shared spectrum to provide service, and efficient use of shared spectrum resources is one of the ITU pillars. To realize the full benefits and potential of non-GSO FSS systems, the ITU must ensure equitable access to co-frequency spectrum resources for non-GSO systems and GSO networks while also increasing the efficiency of intra-service spectrum sharing through careful consideration of the ITU's regulatory provisions.

Article **22** of the Radio Regulations (RR) and Resolution 76 (Rev. WRC-15) contains provisions that aim, in principle, to ensure the compatibility of non-GSO FSS operations with GSO networks in the 14/11 GHz and 30/20 GHz frequency bands. Among these provisions are the uplink and downlink equivalent power flux-density (epfd↑ and epfd↓) limits developed in 1997 and 2000. Yet NGSO systems and GSO networks today are vastly different in design and operational capabilities than the systems that were considered when developing the Article 22 epfd limits nearly twenty-five years ago. Satellite technology and our knowledge about how NGSO systems and GSO networks operate in practice has advanced significantly since that time. Technological progress in radio communication enables satellite systems such as smaller spot beams, adaptive modulation, and frequency re-use allow satellite systems to utilize spectrum efficiently and in a manner that is more robust to interference then satellite systems from two decades ago. This is true for fixed-satellite service whether operating in the geostationary or non-geostationary orbits.

The Article 22 epfd limits in the 14/11 GHz and 30/20 GHz are spectrally inefficient as demonstrated during the work under WRC-19 AI 1.6 and included in ITU-R Report S.2462-0 (07/2019). Equally important, the epfd limits were developed without taking into account long-term GSO protection criteria,

and thereby overestimating long-term GSO protections. The EPFD limits were developed by considering an short-term aggregate protection criteria contained in *Recommends 3.1* of Recommendation ITU-R S.1323, i.e. 10% decrease in unavailability, derived using anomalous assumptions, and then subdividing these limits by a presumed notional 3.5 operational non-GSO systems. Consequently, because the sharing and regulatory provisions of Article 22 in the portions of 14/11 GHz and 30/20 GHz frequency bands in which epfd limits have been demonstrated to be inefficient and present clear issues with the lack of consideration of long-term protection thresholds limits, it is urgent and necessary to review and update them.

This creates multifold inefficiencies. The current Article 22 provisions allow for a particular aggregate set of non-GSO satellites to exceed the aggregate epfd limits even though it passes the GSO protection criteria outlined in Recommendation ITU-R S.1323 when applied against each reference GSO link. Likewise, scenarios can arise in which a particular non-GSO system will meet a particular epfd limit mask but will not pass the sharing criteria outlined in Recommendation ITU-R S.1323. Notably, these issues were identified and addressed in WRC-19 for the Q/V bands, leading to a new and more efficient sharing framework for those bands and the entry into force of Resolutions 770 and 769.

In addition to the spectrum inefficiency that results from the methodology used to derive the aggregate epfd limits in the Ka- and Ku-bands, long-term epfd limits for non-GSO system protection of GSO networks have the potential to be overly conservative and therefore overly protective. Recommendation ITU-R S.1323, the basis for the aggregate epfd limits developed in 1997 and 2000, does not contain any long-term protection threshold (Methodology A). The following scenario demonstrates the overly conservative and therefore overly protective nature of these limits. Based on the apportionment of the allowable error performance degradations to the FSS hypothetical digital paths arising from time invariant interference for systems below 30 GHz, ITU-R S.1432-1 calculates an -12.2 dB I/N, corresponding to 6% increase in ΔT/T. Figures 1-3 below show the Article 22 epfd limits in the Ka- and Ku-band translated into I/N by using a noise temperature of 195 K and using a reference frequency of 17.8 GHz, 19.7 GHz and 10.7 GHz, respectively. All I/N curves, corresponding to the epfd limits for different diameter GSO receive antennas, have I/N well below -12.2 dB I/N at long-term percentages of time.

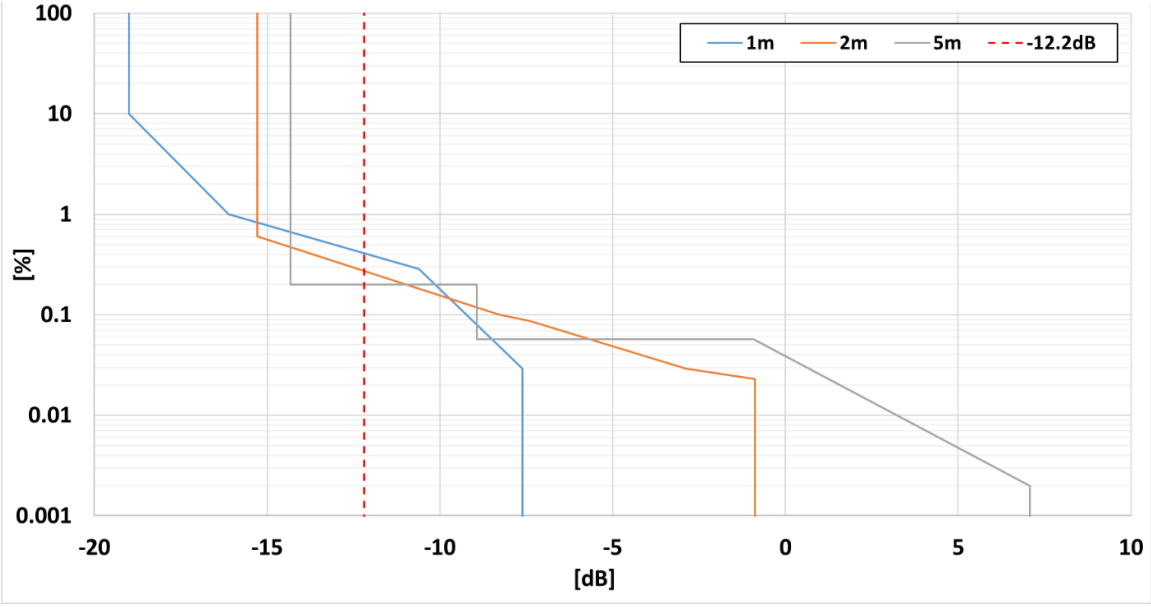

Figure 1: EPFD limits in the Ka band (17.8- 18.6 GHz) translated into I/N curves by assuming a noise temperature of 195 K

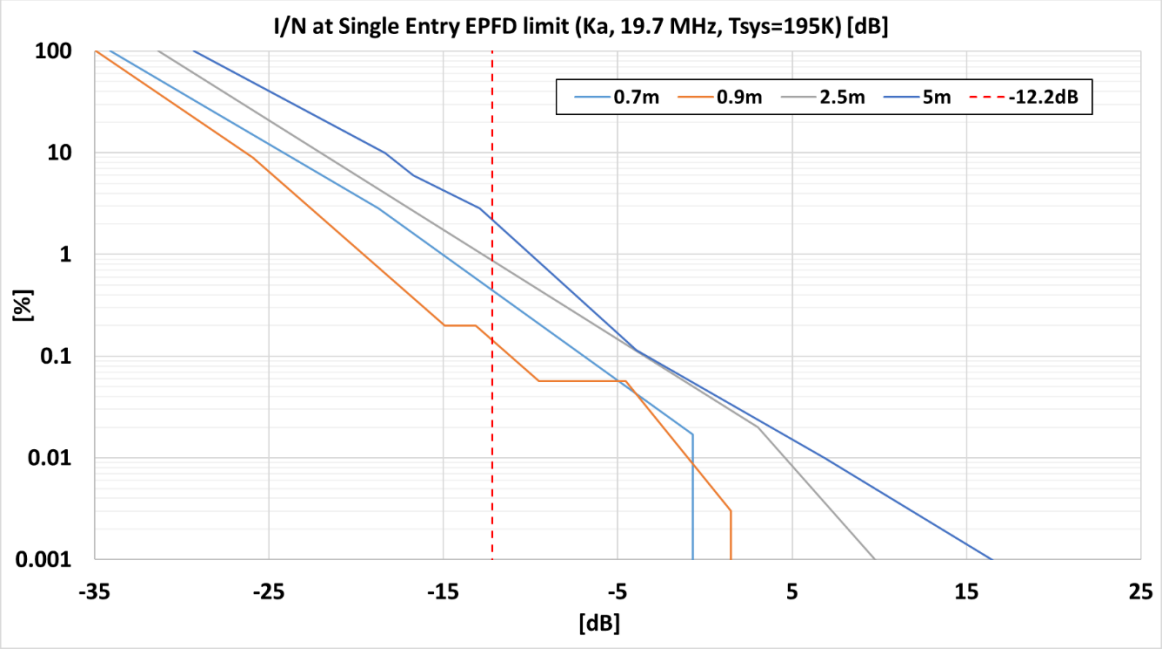

Figure 2: EPFD limits in the Ka band (19.7-20.2 GHz) translated into I/N curves by assuming a noise temperature of 195 K

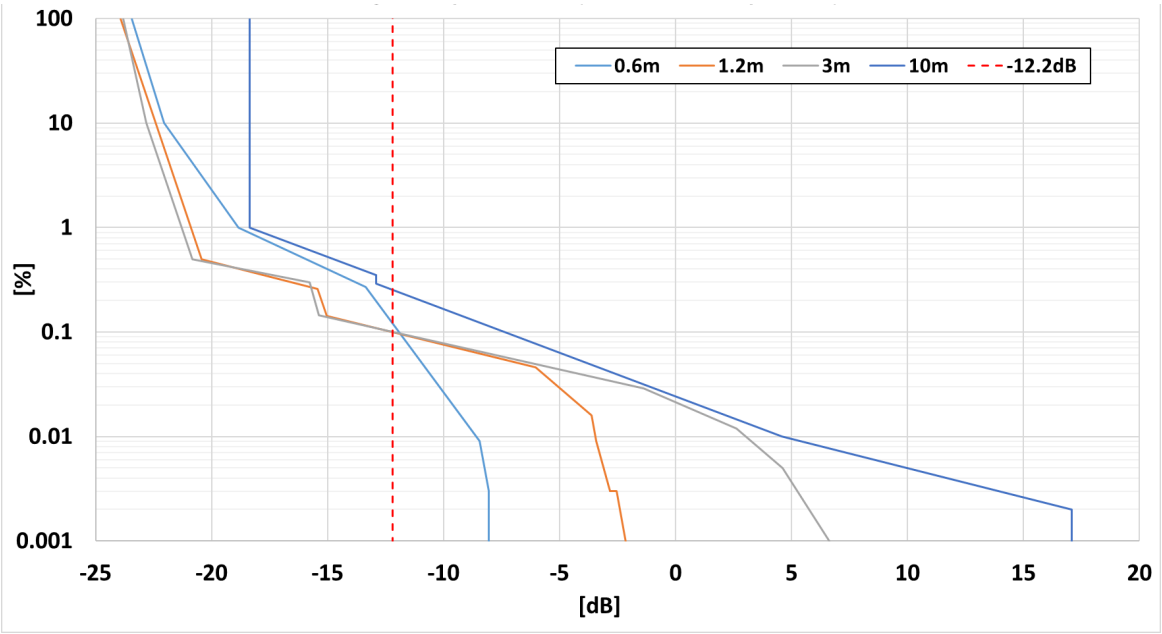

Figure 3: EPFD limits in the Ku band translated into I/N curves by assuming a noise temperature of 195 K

In short, the Article 22 epfd limits were derived in a manner that has resulted in spectrum inefficiencies. Equally important, the long-term epfd limits were developed without taking into account long-term GSO protection criteria, thereby overestimating long-term GSO protection criteria. Consequently, because the sharing and regulatory provisions of Article 22 in the portions of 14/11 GHz and 30/20 GHz frequency bands in which epfd limits apply are known to be inefficient and present clear issues with long-term epfd limits, it is urgent and necessary to review and update them. Considering the fact that the ITU framework does not result in spectrally efficient operation of modern satellite networks in the assumptions that led to the aggregate epfd limits to protect GSO networks, and from there, to the derivation of the single-entry

limits, it is clear that the time has come to revisit the values of those limits. The goal is to achieve a more efficient and rational balancing of the equities between GSO and non-GSO operations while respecting the regulatory regime.

Such an examination would be consistent with new Plenipot Resolution **219 (Bucharest, 2022)**, which recognizes the need to review technologies used in GSO networks and the increased number of satellites in non-GSO systems, "with a view to addressing them, if necessary, in the Radio Regulations in in the processing of frequency assignments by the [BR]."[27] The same resolution calls for ITU-R studies "on the issue of the increasing use of radio-frequency spectrum and associated orbit resources in non-GSO orbits and the long-term sustainability of these resources, as well as on equitable access to, and rational and compatible use of, the GSO and non-GSO orbit and spectrum resources."

In the proposals below, the United States seeks to start the review process contemplated by PP-22 and improve the ability of non-GSO FSS systems to use the Ku-band and Ka-band frequencies subject to No. **22** epfd limits (including the aggregate limits in Resolution 76 (Rev.WRC-15). The United States recognizes that this effort will overlap to some degree with the consideration of revisions to Resolution 76 (Rev.WRC-15) to consider the establishment of a consultation process for assuring conformity with and rectifying potential exceedances of the aggregate epfd limits in that resolution and No. 22.5K and proposes to include those discussions as part of the work under this proposed Agenda Item.

[27] The new PP-22 resolution (Resolution 219 (Bucharest, 2022)) goes on to call for ITU-R studies "on the issue of the increasing use of radio-frequency spectrum and associated orbit resources in non-GSO orbits and the long-term sustainability of these resources, as well as on equitable access to, and rational and compatible use of, the GSO and non-GSO orbit and spectrum resources," and to bring the matter to "the subsequent" WRC for consideration and necessary action.

ADD USA/10/1

DRAFT NEW RESOLUTION [USA-10-2027] (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 WRC-27;

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 WRC-23 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:

2 to review and update regulatory provisions for sharing between non GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which No. **22** epfd limits apply;

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, 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 WRC-27;

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.

Reasons: To provide for urgent studies in the Ku and Ka-band frequency range to review and revise, as appropriate the epfd limits applicable to non-GSO FSS systems and associated regulatory provisions.

ADD USA/10/2

Draft New Resolution [EPFD REVISION] (WRC-23)

Review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 10.7-14.5 GHz, 17.3-20.2 GHz and 27.5-30 GHz frequency bands in which Article 22 and Resolution 76 (Rev. WRC-15) epfd limits apply

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that systems based on the use of new technologies associated with both geostationary-satellite orbit (GSO) networks and non-geostationary-satellite orbit (non-GSO) constellations are capable of providing high-capacity and low-cost means of communication even to the most isolated regions of the world;

b) that GSO and non-GSO satellite orbits and associated spectrum are valuable resources and equitable access to these resources should be protected for the benefit of all countries in the world;

c) the need to encourage the development and implementation of both GSO and non-GSO technologies at frequencies at 14/11 GHz and 30/20 GHz

d) the need to ensure equitable access to co-frequency spectrum resources for non-GSO FSS systems and GSO networks while increasing the efficiency of intra-service spectrum sharing;

e) that No. **22** of the Radio Regulations contains provisions that aim, in principle, to ensure compatibility between non-GSO FSS operations and GSO networks for the 14/11 GHz and 30/20 GHz frequency bands. Among these provisions are the uplink, downlink and inter-satellite equivalent power flux-density (epfd↑, epfd↓, and $epfd_{is}$) limits; and

f) that Resolution 219 of the ITU Plenipotentiary meeting of 2022 instructs the relevant ITU Radiocommunication Sector (ITU-R) study groups to perform studies on the issue of the increasing use of radio-frequency spectrum and associated orbit resources in non-GSO orbits, as well as on equitable access to, and rational and compatible use of, the GSO and non-GSO orbit and spectrum resources, consistent with the objectives of Article 44 of the Constitution;

g) that non-GSO FSS systems would benefit from an updated review and specification of measures required to protect GSO FSS and BSS satellite networks under No. **22.2**;

recognizing

a) that the Article **22** and Resolution **76 (Rev.WRC-15)** equivalent power flux-density (epfd) limits apply to non-GSO FSS systems in in the portions of the 14/11 GHz and 30/20 GHz frequency bands in which Article **22** epfd limits apply to protect GSO FSS and BSS satellite networks from non-GSO FSS satellite systems;

b) that non-GSO FSS systems and GSO FSS networks are vastly different today than the systems that were considered in developing No. **22** epfd limits in 1997 and 2000, and the knowledge about how these systems operate in practice has advanced significantly since then;

c) that Recommendation ITU-R S.1323 provides information on operational requirements and protection criteria that may be used in sharing studies;

d) that Article **22** and Resolution **76 (Rev.WRC-15)** limits were derived taking into account only a short-term protection criterion;

e) that Recommendation ITU-R S.2131 recommends a long-term protection criterion for satellite systems utilizing adaptive coding and modulation (ACM) that was not taken into account during the development of epfd limits by WRC-2000;

f) that the epfd limits applicable to 14/11 GHz and 30/20 GHz non-GSO FSS systems overestimate the amount of long-term protection required by GSO FSS and BSS networks, and this unnecessarily constrains non-GSO systems without providing any protection benefit to GSO networks;

g) that the generic GSO links developed and used in the derivation of epfd limits for WRC-97 do not reflect adequately modern GSO networks and related technology and, therefore, should be updated for the benefit of the GSO community;

h) that the issues linked to *recognizing d)*, in view of *recognizing e)*, were identified and addressed in WRC-19 for the Q/V bands, leading to an alternative and more efficient sharing framework for those bands and the development of provisions No. **22.5L** and No. **22.5M**;

recognizing further

that the Article **22** power flux-density (epfd) limits for to non-GSO FSS systems operating in portions of the 14/11 GHz and 30/20 GHz frequency bands were designed solely to protect GSO FSS and BSS satellite networks, as Article **21** limits apply for terrestrial services;

noting

a) that WRC-23 initiated consideration, under Agenda item 7, Topic J, of possible revisions to Resolution **76 (Rev.WRC-15)** to study or consider development of a consultation procedure to ensure that the aggregate epfd limits in the Resolution are not exceeded;

b) that, taking into account *recognizing g)* above and Resolutions **769 (WRC-19)** and **770 (WRC-19)**, [WRC-23 deferred] finalization of a consultation procedure for aggregate epfd compliance until WRC-27, and in would be appropriate for ITU-R studies to address that procedure in conjunction with the results of the studies call for in *resolves to invite ITU-R* below;

resolves to invite ITU-R

1 to conduct, and complete in time for WRC-23, studies aimed at reviewing and updating the regulatory provisions for spectrum sharing between non-GSO FSS systems and GSO networks in the portions of the 10.7-14.5 GHz, 17.3-20.2 GHz and 27.5-30 GHz frequency bands in which Article **22** and Resolution **76 (Rev.WRC-15)** epfd limits apply; and

2 to identify, within the context of *resolves 1*, a sharing framework that ensures that administrations operating a non-GSO FSS system fulfill their obligations under No. **22.**2 of the Radio Regulations while ensuring equitable and efficient spectrum sharing between non GSO FSS systems and GSO FSS networks, taking into account the developments by WRC-19 of No. 22.5 L and No. 22.5M considered in *Recognizing h)*;

3 to complete, with reference to *notings a*) and *b*) above, the development of a consultation procedure and process for use by non-GSO FSS systems in the frequency bands listed in Recognizing a);

invites the 2027 World Radiocommunication Conference
to consider the results of the above studies and take necessary regulatory actions, as appropriate;

Reasons: To provide for urgent studies in the Ku- and Ka-band frequency range to review and revise, as appropriate the epfd limits applicable to non-GSO FSS systems and associated regulatory provisions.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM FOR [REVIEW AND UPDATE REGULATORY PROVISIONS FOR SHARING BETWEEN NON-GSO SYSTEMS AND GSO NETWORKS IN THE PORTIONS OF 10.7-14.5 GHZ, 17.3-20.2 GHZ AND 27.5-30 GHZ FREQUENCY BANDS IN WHICH ARTICLE 22 AND RESOLUTION 76 (REV. WRC-15) EPFD LIMITS APPLY]

Subject: Proposed future WRC-2027 agenda item to [review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 10.7-14.5 GHz, 17.3-20.2 GHz and 27.5-30 GHz frequency bands in which Article 22 and Resolution 76 (Rev. WRC-15) epfd limits apply];

Origin: United States of America

Proposal: [To review and update regulatory provisions for sharing between non GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which No. 22 epfd limits apply.]

***Background/reason**: [NGSO and GSO networks today are vastly different in design and operational capabilities than the systems that were considered when developing the Article 22 epfd limits nearly twenty-five years ago. The Article 22 epfd limits in the 14/11 GHz and 30/20 GHz are spectrally inefficient as demonstrated during the work under WRC-19 AI 1.6. Equally important, the epfd limits were developed without taking into account long term GSO protection criteria, and thereby overestimating long term GSO protections. Consequently, because the sharing and regulatory provisions of Article 22 in the portions of 14/11 GHz and 30/20 GHz frequency bands in which epfd limits have been demonstrated to be inefficient and present clear issues with the lack of consideration of long-term protection thresholds limits, it is urgent and necessary to review and update them.]*

***Radiocommunication services concerned**:* [Fixed Satellite Service, Mobile Satellite Service, BSS, EESS, Radio Astronomy and other services]

***Indication of possible difficulties**:* [ ]

***Previous/ongoing studies on the issue**:* [ ]

Studies to be carried out by: [WP4A]	*with the participation of:* Administrations and Sector members of the ITU-R

***ITU-R Study Groups concerned**: [SG4]*

***ITU resource implications, including financial implications (refer to CV126)**:* This proposed agenda item will be studied within the normal ITU-R procedures and planned budget.

***Common regional proposal**:* Yes/No	***Multicountry proposal:*** Yes/No *Number of countries:*

Remarks

VIEW B

View B

No WRC-27 Agenda Item to study Article 22 EPFD Limits

The United States should not propose a WRC-27 Agenda Item (AI) to review the Ku and Ka-band EPFD limits in Article 22 or Resolution 76 of the Radio Regulations that governs the co-existence of non-geostationary (NGSO) satellite systems with geostationary (GSO) satellite networks.

There are nine main reasons not to adopt that proposal:

1. Article 22 is a long established and clear method for sharing spectrum between Ku and Ka band GSO and NGSO networks.

2. Billions of dollars have been invested in existing and planned Ku and Ka band GSO-based networks and services in reliance on the existing EPFD framework specified in Article 22.

3. New and innovative Ku and Ka band GSO networks and services (including those to be deployed in the next few years) currently are being developed in reliance on Article 22.

4. The Article 22 framework does not "overprotect" Ku and Ka band GSO networks from NGSO interference. To the contrary, the FCC has found that the Article 22 provisions that constrain NGSO interference "were not developed with the most advanced modern GSO networks in mind."[28]

5. Exceedances of permitted levels of NGSO interference that occur on a short-term basis are a particular concern because of the disruptive impact of such interference on GSO services (*e.g.*, potential to degrade service or even disrupt a video call, real-time news or sports event, or critical communications link) and the time needed to recover from such disruptions.

6. The main problems that exist today with the EPFD provisions in Article 22 lie *in how they are applied*, including:

    - Unaddressed abuses reflected by splitting a single NGSO system into multiple ITU filings to evade the requirements of Article 22;[29]

    - Unresolved failures of the ITU software to identify geometric alignments where NGSO interference in excess of that permitted by Article 22 can be shown to exist;[30] and

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[28] *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters,* 32 FCC Rcd 7809, ¶ 35 (2017).

[29] *See* Letter from GSO Operators to Marlene H. Dortch, FCC, File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818-00105 (Call Sign S3069) (Oct. 14, 2022); *see also* Space Exploration Holdings, LLC, *Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, Order and Authorization, File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818-00105, FCC-22-91¶¶ 31, 32, 34 (Dec. 1, 2022) conditioned the Starlink Gen2 license on obtaining a favorable or qualified favorable finding from the ITU Radiocommunication Bureau "that explicitly indicates the ITU has considered the joint effect of SpaceX's multiple ITU filings."

- Unaddressed efforts of certain NGSO systems to "game" the system, by manipulating their EPFD inputs in a way that does not reflect reality, in an effort to mask the true level of NGSO interference in excess of that permitted by Article 22.[31]

7. The framework developed for the "greenfield" that is the Q/V band is vastly different than the EPFD framework applicable to the Ku or Ka bands, where GSO satellites have been operating for decades and provide a wide range of services, including new broadband mobility services and direct to consumer services.

8. For these reasons, and as the ITU Plenipotentiary recently recognized in Resolution 219,[32] it is urgent to address (i) these types of issues associated with NGSO systems at the study group level before even considering reopening Article 22, as well as (ii) the impact of the continued and expanded launch and operation of a large number of NGSO satellites:

- It instructed the Radiocommunication Assembly to perform the necessary studies through relevant ITU "study groups on the issue of increasing use of radio-frequency spectrum and associated orbit resources in non-GSO orbits and the long-term sustainability of these resources, as well as equitable access to, and rational and compatible use of, the GSO and non-GSO orbit and spectrum resources, consistent with the objectives of Article 44 of the Constitution."

- The Plenipotentiary further instructed that these issues should be reported on by the Radiocommunication Bureau to WRC-23 and that Member States act at the national level "when authorizing non-GSO systems, to take all necessary actions to avoid unacceptable interference to GSO and other non-GSO systems as well as other radio services, of other administrations and to ensure efficient use of radio-frequency spectrum and associated orbits."

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[30] ITU-R contribution, Document 4A/833-E (7 September 2022), Viasat, Inc., *Proposal for Addressing Non-Detection of EPFD Exceedances Due to Reliance on Only a Worst-Case Geometry Evaluation*, demonstrating that NGSO systems which have received favorable EPFD findings by the ITU Radiocommunication Bureau under the current process have been shown to exceed the Radio Regulations Article 22 EPFD↓ limits with other geometries. Peak exceedances range from 3 - 8 dB; incorporated into Working Party 4A Chairman's Report, Document 856, Report on the meeting of the Working Party 4A (Geneva, 14-22 September, 2022), Annex 7, *Working document towards a preliminary draft revision of Recommendation ITU-R S.1503 - Functional description to be used in developing software tools for determining conformity of non-geostationary orbit fixed-satellite service systems or networks with limits contained in Article 22 of the Radio Regulations.*

[31] *See* Letter from Pantelis Michalopoulos, Counsel to DISH Network Corporation, to Marlene H. Dortch, FCC, IBFS File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818-00105 (Call Sign S3069) (March 6, 2023) demonstrating that "SpaceX based its new power level calculations on an incorrect and non-compliant exclusion zone for the protection of geostationary ("GSO") satellites in an attempt to manufacture a showing of compliance with the International Telecommunication Union's ("ITU's") power limits."

[32] *See* International Telecommunication Union, Final Acts of the Plenipotentiary Conference, Resolution 219 (Bucharest, 2022), titled "Sustainability of the radio-frequency spectrum and associated satellite orbit resources used by space services", https://www.itu.int/pub/S-CONF-ACTF-2022.

9. Article 22 ensures the efficient use of the GSO/NGSO shared Ku and Ka band frequencies. Namely: (i) NGSO systems can and do freely operate across a wide swath of orbits around the world without adversely affecting use of the GSO orbit, (ii) GSO networks are by definition constrained to operating in the limited orbital region above the equator, and (iii) NGSO interference into the numerous GSO networks operating above the equator is kept to permitted levels.

For these reasons, we strongly urge the Commission to reject the proposal contained in WAC IWG-3 Document 80.

WRC-23 Agenda Item 10

Future Agenda Item proposal to review and update

IWG-3 members were not able to reach consensus on a draft U.S. proposal for WRC-23 Agenda Item 10 for a WRC-27 agenda item to study spectrum for communication operations on the lunar surface. IWG-3 considered a NTIA proposal on this topic contained in Document IWG-3/87.

IWG-3 provides a View A and View B.

View A is supported by: CTIA

View B is supported by: Lockheed Martin

VIEW A

IWG-3/091_10 Lunar RCS (15.03.23)
Author: CTIA

Note to WAC: Redlines proposed on the RCS document contained in DocumentIWG-3/87. View A members offer modifications to this proposal which offers a more manageable study than that previously considered in the WAC to establish a regulatory framework for lunar operations.

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

BACKGROUND INFORMATION:

The Artemis Accords[33] lay out a shared vision for principles, established in the Outer Space Treaty of 1967, for cooperation in the civil exploration and use of the Moon, Mars, comets and asteroids for peaceful purposes. The United States led in part by its space agency, NASA, and space agencies from other ITU Member States, are preparing for a return of human and robotic explorers to the Moon while developing spacecraft, surface vehicles, exploration mission plans toward achieving a sustainable and robust presence on the Moon in the next decade.

In addition to the traditional means of space-to-Earth and Earth-to-space communication links, direct communications between landers, rovers, extravehicular activity (EVA) astronauts conducting sortie missions and experiments is crucial to enable effective scientific activities and consideration of the health of the crew in the lunar environment. Initial surveys of available technologies has indicated that a network based on the 3GPP standard can be capable of servicing the reference mission concept of operation involving many user groups over a widespread surface area with high data throughput requirements. However, considering the unique topology of the Moon's surface, shielded zone of the Moon considerations, unique science opportunities in radio astronomy, and remote sensing in the lunar region/surface, careful consideration and spectrum sharing/compatibility studies are required to determine the suitable bands to support the envisioned lunar surface network using the 3GPP standard or other standards. This proposal would also establish an international regulatory framework for use of spectrum on the moon, which falls outside the three Regions described in Section I of Article 5.

PROPOSAL:

The United States proposes an agenda item for WRC-27 to study the establishment of a new Radio Regulations Article pertaining to telecommunications use ~~the feasibility and compatibility of a new~~

[33] As of July 2022 the Artemis Accords were signed by the governments of: Australia, Bahrain, Brazil, Canada, Colombia, France, Israel, Italy, Japan, the Republic of Korea, Luxembourg, Mexico, New Zealand, Poland, Romania, Saudi Arabia, Singapore, Ukraine, the United Arab Emirates, the United Kingdom, and the United States.

~~allocation to the space research service (space-to-space)~~ for ~~point-to-multipoint~~ networks located on the lunar surface between a base station and EVA/rovers up to a 50 km radius. The frequency ranges of interest are: 390-450 MHz, 2 400-2 700 MHz, 3 35~~0~~0-3 800 MHz (3GPP n78), 5 150-5925 MHz, and 24~~5~~.25-29.5~~8.35~~ G~~M~~Hz (3GPP n257/n258).

Proposals

ADD USA/4253A27/1

DRAFT NEW RESOLUTION [USA-A2027]

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 WRC-27;

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 WRC-19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

[…]

1.X to consider, in accordance with Resolution **[USA-B2027] (WRC-23),** ~~conduct studies on~~the development of a regulatory framework for, and the spectrum needs of, ~~and regulatory measures for possible new allocations to the space research service (space-to-space) to support point-to-multipoint~~ systems on the lunar surface in the frequency bands 390-450 MHz, 2 400-2 700 MHz, 3 35~~00~~-3 800 MHz, 5 150-5 925 MHz, and 24~~5~~.25-29.5~~8.35~~ GHz ~~in accordance with Resolution **[USA-B2027] (WRC-23)**~~;

[…]

invites the ITU Council

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

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting (CPM) and to prepare a report to WRC-23;

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

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To create an agenda item for WRC-27 to study the establishment of a regulatory framework ~~the feasibility and compatibility of a new allocation to the space research service (space-to-space)~~ for ~~point-to-multipoint~~ networks located on the lunar surface in certain frequency bands.

ADD USA/4253A27/2

DRAFT NEW RESOLUTION [USA-B2027]

Studies on the establishment of an international spectrum management regulatory framework in support of the ~~frequency-related matters, including possible additional allocations to the space research service (space-to-space), for~~ future development of ~~point-to-multipoint~~ communications networks on the lunar surface

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is increased interest ~~by space research service operators from multiple Member States~~ to conduct scientific experiments and exploration activities in the vicinity of the Moon, including on its surface;

b) that point-to-multipoint communication technology is well-developed and widely deployed on the Earth using industry standards to ensure compatibility with other services;

c) that the definition of *radiocommunication service* contained in RR No. **1.19** limits the definitions of the *fixed* and *mobiles* service to apply only to *terrestrial radiocommunication*;

d) that the average distance between the Earth and the Moon is 382 500 km and, therefore, within the 2×10^6 km range provided in RR No. **1.177** to define deep space;

e) that ~~point-to-multipoint~~ systems that would operate on the lunar surface would require an operating range of no more than approximately 50 km;

~~*f)* that point-to-multipoint systems on the lunar surface could operate in the space research service (space-to-space);~~

f~~g~~) that the lunar surface has unique atmospheric, soil, and topography conditions;

g~~h~~) that the benefits of scientific discovery and space exploration are of a global nature,

noting

Section V of Article **22** regarding protection of radio astronomy in the shielded zone of the Moon,

noting further

that the Artemis accords which promote safe, sustainable, and responsible space exploration have been signed by ITU Member States from all three Regions,

recognizing

a) the Radio Regulations do not current provide a regulatory framework for use of spectrum

in the lunar environment

b) that the use of ~~studies of sharing and compatibility between point-to-multipoint~~ systems operating ~~under the space research service (space-to-space)~~ on the lunar surface would need to take into account ~~any other~~ allocated services in the same or, as appropriate, adjacent bands,

~~a)~~c) modifications to Article 5 are outside the scope of this Resolution,

resolves to invite the ITU Radiocommunication Sector

1 ~~1~~ to study the establishment of a regulatory framework for the use of ~~spectrum needs of the space research service limited to point-to-multipoint~~ systems which may operate on the lunar surface;

~~1~~2 to study the spectrum needs, and the technical and operational characteristics for those systems in *resolves 1* that may operate in the frequency bands 390-450 MHz, 2 400-2 700 , 3 3~~5~~00-3 800 MHz, 5 150-5925 MHz, and 2~~4~~5.25-29.5~~8.35~~ GHz;

~~2 to study the propagation considerations for point-to-multipoint systems operating in the frequency ranges in *resolves to invite the ITU Radiocommunication Sector* 1 on the lunar surface;~~

~~3 to~~ to perform ~~study~~ sharing and compatibility studies between the systems as identified in *resolves to invite the ITU Radiocommunication Sector* 1 and 2 and other services allocated to and, as appropriate, in adjacent bands;

4 to complete these studies in time for~~by~~ WRC-27,

invites administrations

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

invites the 2027 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, excluding any new allocations or changes to the existing allocations in Article **5** ~~as appropriate~~, to provide a regulatory framework ~~additional allocations to the space research service (space-to-space)~~ for the purpose~~s~~ of facilitating ~~point-to-multipoint~~ systems operating on the lunar surface.

Reasons: To provide a Resolution supporting the agenda item.

ATTACHMENT

DRAFT PROPOSAL FOR AGENDA ITEM

Subject: Propose a WRC-27 agenda item to study a regulatory framework for~~possible allocation to SRS (s-s)~~ for lunar surface EVA/Rover comm, within 50 km radius of a lunar ~~base~~ ground station.

Origin: United States of America

Proposal: to consider, in accordance with Resolution [**USA-B2027] (WRC-23),** the development of a regulatory framework for, and the spectrum needs of, systems on the lunar surface in the frequency bands 390-450 MHz, 2 400-2 700 MHz, 3 300-3 800 MHz, 5 150-5 925 MHz, and 24.25-29.5 GHz;~~to add to the Table of Frequency Allocations a new primary allocation of Space Research Service in the space-to-space direction in the frequency ranges, in accordance with **Resolution [USA-B2027] (WRC-23).~~**

Background/reason:

The Artemis Accords lays out a shared vision for principles, grounded in the Outer Space Treaty of 1967, for cooperation in the civil exploration and use of the Moon, Mars, Comets and Asteroids for peaceful purposes. NASA and numerous space agencies around the world, as partners in the Artemis missions, are preparing for a return of human to the Moon while developing spacecraft, surface vehicles, exploration mission plans toward achieving a sustainable and robust presence on the Moon in the next decade. In addition to the tradition means of space-to-Earth and Earth-to-space communication links, direct communications between landers, rovers, extravehicular activity (EVA) astronauts conducting sortie missions and experiments is crucial to enable effective scientific activities consideration the health of the crew in the lunar environment. Initial survey of available technologies has indicated that a network based on 3GPP standard can be capable of servicing reference mission concept of operation involving many user groups over a widespread surface area with high data throughput requirements. However, considering the potential unique topology of the Moon surface, shielded zone of the Moon considerations, unique science opportunities in radio astronomy and remote sensing in the lunar region/surface, careful consideration and spectrum sharing/compatibility studies are required to determine the suitable spectrum bands to support the envisioned 3GPP standard based lunar surface network.

This future conference agenda item proposes to study the compatibility of a new SRS (space-to-space) allocation for a ~~point-to-multipoint~~ network between a lunar ground~~base~~ station and EVA/rovers up to 50 km radius. The frequency ranges of interests are: 390-450 MHz, 2 400-2 700 , 3 3~~5~~00-3 800 MHz, 5 150-5925 MHz, and 2~~45~~.25-29.5~~8.35~~ GHz.

Radiocommunication services concerned: radiodetermination-satellite service, radionavigation-satellite service, radio astronomy service, active and passive remote sensing systems, space operation and space research services.

Indication of possible difficulties: none foreseen

Previous/ongoing studies on the issue: none

Studies to be carried out by: WP 7B	***with the participation of:*** WPs 4C, 7C, 7D

ITU-R Study Groups concerned: SG 7

ITU resource implications, including financial implications (refer to CV126): minimal

Common regional proposal: TBD	***Multi-country proposal:*** No ***Number of countries:***

Remarks

VIEW B

IWG-3/090 (03.21.23)
Author: S. Kotler (Lockheed Martin)

WRC-23 AGENDA ITEM 10 (Lunar Communications)

VIEW B

View B supports that the NTIA proposal in document IWG-3/087 be reconciled with the proposal contained in document WAC-67 to recommend that the U.S. propose to WRC-23 for a WRC-27 agenda item related to studying the feasibility and compatibility of current and potentially new spectrum allocations in specific frequency bands using the existing regulatory framework to support radiocommunications between and with stations on the lunar surface, cislunar orbit, and Earth.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 4

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: Resolution **160 (WRC-15)** "Facilitating access to broadband applications delivered by high-altitude platform stations" invited the ITU-R to study additional spectrum needs for gateway and fixed terminal links for HAPS to provide broadband connectivity in the fixed service under WRC-19 agenda item 1.14. WRC-19 decided to identify several fixed service bands (taking into account No. **4.23**) for HAPS operation along with associated Resolutions providing protections for the incumbent services. The work under Resolution **160 (WRC-15)** was completed at WRC-19, and the Resolution was inadvertently not suppressed by WRC-19. The proposal below corrects that oversight by abrogating Resolution **160 (WRC-15)**.

Proposal:

SUP USA/4/1

RESOLUTION 160 (WRC-15)

Facilitating access to broadband applications delivered by high-altitude platform stations

Reasons: The work proposed under Resolution **160 (WRC-15)** is complete. ITU-R activities under WRC-19 agenda item 1.14 completed the studies and associated regulatory actions.

_____

Comments of IWG-4 on NTIA/RCS Proposals to SUP Resolutions 75 (Rev.WRC-12) and 161 (WRC-15) under Agenda Item 4

At its 19th meeting on March 21, 2023, IWG-4 considered the NTIA/RCS proposals to suppress Resolutions **75 (Rev.WRC-12)** and **161 (WRC-15)** under WRC-23 Agenda Item 4 (Doc. WAC/109 and IWG-4/059, pp. 3 and 5). IWG-4 reports that it was not in a position to formulate a view or views on these proposals for the WAC.

WRC-23 Agenda Item 7

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

IWG-4 members were not able to reach consensus on a draft U.S. proposal for WRC-23 Agenda Item 7, Topic A (tolerances for certain orbital characteristics of non-GSO space stations of the FSS, BSS or MSS). This document provides two views on the appropriate regulatory changes the FCC should support.

View A, which begins on page 3 of this document, is supported by: Amazon, SES, Mangata Networks, Boeing, AST Science

View B, which begins on page 18 of this document, is supported by: OneWeb and SpaceX

VIEW A

View A:

Agenda Item 7, Topic A (Tolerances for certain orbital characteristics of non-GSO space stations of the FSS, BSS or MSS)

Reference: IWG-4/049r3 (21.03.2023)

Supported by Amazon, SES, Mangata Networks, Boeing, AST Science

This proposal seeks to address the orbital tolerance issue without imposing hard limits on variations in altitude or inclination that non-GSO satellites deployed may have and still be considered to be operating on a notified orbital plane in their associated frequency assignments. After three years of study in the ITU-R, there has been no agreement or even common understanding on what values for potential limits on altitude and inclination variances are appropriate, so there is no confidence that any limit adopted would allow appropriate operational flexibility; protect recorded systems and satellites from excess interference; and not impose additional protection obligations on other non-GSO systems.
Instead, the proposal in View A, which aligns with Method A4 in the CPM Report for WRC-23, has the following features:

- To be considered brought into use, brought back into use, continuing in use, or deployed for purposes of the milestone procedure in Resolution 35 (WRC-19), a non-GSO satellite must not cause a change in the interference/protection environment as compared with a satellite operating at the notified altitude and/or inclination levels.
- Small changes (i.e., below trigger levels in the new resolution) require only a commitment of no interference environment change; changes above trigger levels require a modification of the notification information and a BR determination of impact on the interference environment. Satellites that negatively impact the interference environment or require more protection/accommodation are not considered BIU, BBIU, continuing in use, or deployed for milestone purposes under Res. 35. No. 13.6 remains an option for the BR to address egregious cases (e.g., going from LEO to MEO).
- Only satellites in Res. 35 bnads and services are subject to the new resolution, with the exeption that satellites in highly-elliptical orbits (as described in considering b) of the new resolution, are not subject to the procedure because of the impact that maintaining tight tolerances has on satellite lifetimes.

The attached proposal strikes the proper balance between assuring reasonable alignment between deployed satellites' altitude/inclination and the MIFR, while also allowing operators reasonable flexibility to adjust their satellites' orbits to respond to operational and environmental matters without negatively iompacting the interference environment.
The organizations and companies listed above urge FCC to adopt the attached draft proposal for WRC-23 Agenda Item 7, Topic A.

IWG-4/049R3 (2023.21.03)
Author: A. Epshteyn (Amazon)
H. Barvar (Amazon)

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 7: *to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate 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 of the FSS, BSS or MSS*

BACKGROUND INFORMATION:

WRC-19 invited the ITU-R to study "as a matter of urgency, tolerances for certain orbital characteristics of non-GSO space stations of the fixed-satellite, mobile-satellite or broadcasting satellite services to account for potential differences between the notified and deployed orbital characteristics for 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."[34]
The objective of this proposal would be to determine the allowable differences between the values recorded in the Master International Frequency Register (MIFR) for the specified orbital characteristics of non-GSO space stations operating on notified frequency assignments and those representative of the actual deployment of these non-GSO space stations. The concept of tolerances arises from the obligations stipulated in the Radio Regulations (RR):

– to deploy at least one satellite on a notified orbital plane for a successful completion of the bringing into use (BIU) or bringing back into use (BBIU) of frequency assignments to a fixed-satellite service (FSS), broadcasting-satellite service (BSS) or mobile-satellite service (MSS) non-GSO satellite network or system irrespective of the frequency bands (see RR No. **11.44C** and RR No. **11.49**.2);
– to deploy satellites on a notified orbital plane to satisfy the milestones stipulated in Resolution **35 (WRC-19)** for some services in some bands, and

[34] See WRC-19 Document CMR19/571 (10th Plenary Minutes), Section 10.5, paragraph 2.

– to operate frequency assignments in accordance with the notified required characteristics as specified in RR Appendix **4**.

It should be noted that WRC-19 also adopted RR No. **11.44C** and associated sub-footnotes, which indicate that the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to RR Appendix **4** (i.e., 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). The same four orbital characteristics are also reflected in RR Nos. **11.49.2** through **11.49.5**, and a noting of Resolution **35 (WRC-19)** relating to the milestones for the deployment of non-GSO satellite in some frequency bands and for some services.

Proposals:

MOD USA/7A/1

11.44C A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service, the mobile-satellite service or the broadcasting-satellite service shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the notified orbital plane(s)MOD[27] of the non-geostationary satellite network or system for a continuous period of 90 days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, 28, 29]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-~~19~~23)

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[27] **MOD11.44C.1** and **MOD11.44D.1** For the purposes of No. **11.44C** or No. **11.44D**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.~~5.e~~4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **[B7(A)] (WRC-23)** shall apply. (WRC-~~19~~23)

Reasons: To incorporate a mandatory reference to a new WRC Resolution addressing allowable deviations on elements of a notified orbital plane, and to correct an erroneous reference to Appendix **4**.

MOD USA/7A/2

11.44D A frequency assignment to a space station in a non-geostationary satellite orbit network or system with "Earth" as the reference body, other than a frequency assignment to which No. **11.44C** applies, shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been

deployed on one of the notified orbital plane(s)MOD 27 of the non-geostationary satellite network or system, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau as soon as possible, but not later than 30 days after the end of the period referred to in No. **11.44**.25, 29 On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-~~19~~23)

Reasons: Consequential to the modification of Nos. **11.44C** and **11.44C.1** under Proposal USA/7A/1 above.

MOD USA/7A/3

11.49 Wherever the use of a recorded frequency assignment to a space station of a satellite network or to all space stations of a non-geostationary-satellite system is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of Nos. **11.49.1**, **11.49.2**, **11.49.3** or **11.49.4**, as applicable, so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available as soon as possible on the ITU website and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use32, 33, 34, 35, MOD36 shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. Ninety days before the end of the period of suspension, the Bureau shall send a reminder to the notifying administration. If the Bureau does not receive the declaration of the commencement of the bringing back into use period within thirty days following the limit date of the period of suspension established in accordance with this provision, it shall cancel the entry in the Master Register. The Bureau shall, however, inform the administration concerned before taking such action. (WRC-~~19~~23)

MOD USA/7A/4

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36 **MOD11.49.5** For the purposes of Nos. **11.49.2** and **11.49.3**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.~~5.e~~4.1 (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **[B7(A)] (WRC-23)** shall apply. (WRC-~~19~~23)

Reasons: To incorporate a mandatory reference to a new WRC Resolution addressing allowable deviations on elements of a notified orbital plane, and to correct an erroneous reference to Appendix **4**.

ADD USA/7A/5

DRAFT NEW RESOLUTION [B7(A)] (WRC-23)

An approach to orbital tolerances for the implementation and use of frequency assignments to space stations in a non-geostationary-satellite system in specific bands and services

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that filings for frequency assignments to circular-orbit non-geostationary-satellite (non-GSO) systems composed of hundreds to thousands of non-GSO satellites have been received by ITU since 2011, in particular in frequency bands allocated to the fixed-satellite service (FSS) or the mobile-satellite service (MSS);

b) that non-GSO systems using highly-inclined orbits having an apogee altitude greater than 18 000 km and an orbital inclination between 35° and 145° are typically composed of only a few satellites and the number of such systems notified represents only a small fraction of the number of notified non-GSO systems;

c) that under Nos. **11.44C.1**, **11.44D.1**, **11.49.2** and **11.49.3**, the term "notified orbital plane" means an orbital plane of the non-GSO system, as provided to the Radiocommunication Bureau (Bureau) in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**;

d) that design considerations, availability of launch vehicles to support multiple satellite launches, the need to ensure safe flight operations between satellites in the same and other systems, and other factors can lead to notifying administrations needing to operate some space stations in orbital planes with some nominal variance from the notified orbital planes for the non-GSO systems referred to in *considering a)*;

e) that significant discrepancies between the operational orbital plane(s) of a non-GSO system and the notified orbital plane(s) for those systems as recorded in the Master International Frequency Register (Master Register) could negatively impact the efficient use of the orbit/spectrum resource in any frequency band used by non-GSO systems, including non-GSO systems not subject to this Resolution;

f) that minor discrepancies between the operational orbital plane(s) of a non-GSO system and the notified orbital plane(s) for those systems as recorded in the Master Register may not negatively impact the efficient use of the orbit/spectrum resource in any frequency band used by non-GSO systems, including non-GSO systems not subject to this Resolution;

g) that the determination whether an orbital plane of a non-GSO system has characteristics that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4** as provided to the Bureau in the most recent notification information for the system's frequency assignments is not always straightforward, and can depend on factors that are specific to the non-GSO system in question;

h) that it is important, for consideration of instances where a non-GSO system operates with orbital planes that are at variance with the system's notified orbital planes, that there is a mechanism developed for determining that such at-variance operation does not now and will not in the future result in the space stations of the non-GSO system causing more interference or claiming a higher need for protection than would have been the case if the operational orbital planes matched perfectly with the notified orbital planes for the system;

i) that for purposes of maximizing the efficient use of the orbit/spectrum resource for all non-GSO systems, whether or not they are in the same frequency band or service, it is important for there to be a listing maintained by the Bureau, and periodically updated by filing administrations, of all satellites in a subject non-GSO system that are operating in orbital planes that are at variance with Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4** of any of the system's notified orbital planes, as provided to the Bureau in the most recent notification information for the system's frequency assignments;

j) that notwithstanding *considerings g)*, *h)*, and *i)* above, there will be instances where the Bureau can determine without a methodology that an orbital plane of a non-geostationary-satellite system has characteristics that do not correspond to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4** as provided to the Bureau in the most recent notification information for the system's frequency assignments;

k) that, in addressing the subject of orbital tolerances, there is a need to seek a balance between the prevention of spectrum/orbit warehousing, providing accurate information regarding the operational orbital planes used by non-GSO systems to assist the proper functioning of coordination mechanisms, and the operational requirements related to the safe deployment and operation of a non-GSO system;

l) that satellites using highly-inclined orbits having an apogee altitude greater than 18 000 km and an orbital inclination between 35° and 145° have significant orbital precession rates and consequently, restrictive orbital keeping requirements, and correction of orbit parameters may lead to a reduction of such satellites' lifetime and to frequent replacement;

m) that adherence to a transparent approach to the question of orbital tolerances is desirable, as this reduces uncertainty with respect to the deployment of non-GSO systems,

recognizing

a) that the bringing into use of frequency assignments to non-GSO systems is addressed in Article **11**;

b) that any regulatory mechanism for management of frequency assignments to non-GSO systems in the Master Register should not impose an unnecessary burden;

c) that the core characteristics of notified orbital planes in a non-GSO system are among the notified required characteristics as specified in Appendix **4** (specifically provision A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i);

d) that Resolution **35 (WRC-19)** addresses variances between the actual number of satellites in notified orbital planes and the notified number of satellites for each orbital plane, whereas this Resolution is addressing the subject of variances of deployed versus notified orbital characteristics ;

e) that No. **13.6** is applicable to non-GSO systems with frequency assignments in the frequency bands and services to which this Resolution applies;

f) that No. **11.49** addresses the suspension of recorded frequency assignments to a space station of a satellite network or to space stations of a non-GSO system,

recognizing further

that this Resolution relates to those aspects of non-GSO systems to which *resolves* 1 applies with regard to the notified required characteristics as specified in Appendix **4**, and the conformity of the notified required characteristics of the non-GSO systems, other than those referred to in *recognizing c)* above and Nos. **11.44C.1**, **11.44D.1**, **11.49.2** and **11.49.3** is outside the scope of this Resolution,

noting

that for the purpose of this Resolution:

– the term “frequency assignments” is understood to refer to frequency assignments to a space station of a non-GSO system;

– the term “notified orbital plane” means an orbital plane of the non-GSO system, as provided to the Bureau in the most recent notification information for the system’s frequency assignments, that possesses the general characteristics of items:

- A.4.b.4.a, the angle of inclination of the orbital plane of the space station;
- A.4.b.4.d, the altitude of the apogee of the space station;
- A.4.b.4.e, the altitude of the perigee of the space station; and
- A.4.b.4.i, the argument of the perigee of the orbit of the space station (only for orbits whose altitudes of the apogee and perigee are different)

in Table A of Annex 2 to Appendix **4**;

resolves

1 that this Resolution applies to frequency assignments to non-GSO systems, other than non-GSO systems using the orbits described in *considering* b) above, in the frequency bands and for the services listed in the Table below:

TABLE

Frequency bands and services for application of the orbital tolerance approach

Frequency bands (GHz)	Space radiocommunication services		
	Region 1	Region 2	Region 3

Frequency bands (GHz)	Space radiocommunication services		
	Region 1	Region 2	Region 3
10.70-11.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	
11.70-12.50	FIXED-SATELLITE (space-to-Earth)		
12.50-12.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	BROADCASTING-SATELLITE FIXED-SATELLITE (space-to-Earth)
12.70-12.75	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space)	BROADCASTING-SATELLITE FIXED-SATELLITE (space-to-Earth)
12.75-13.25	FIXED-SATELLITE (Earth-to-space)		
13.75-14.50	FIXED-SATELLITE (Earth-to-space)		
17.30-17.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	None	FIXED-SATELLITE (Earth-to-space)
17.70-17.80	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)
17.80-18.10	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)		
18.10-19.30	FIXED-SATELLITE (space-to-Earth)		
19.30-19.60	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)		
19.60-19.70	FIXED-SATELLITE (space-to-Earth) (Earth-to-space)		
19.70-20.10	FIXED-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth)
20.10-20.20	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)		
27.00-27.50		FIXED-SATELLITE (Earth-to-space)	
27.50-29.50	FIXED-SATELLITE (Earth-to-space)		
29.50-29.90	FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space)
29.90-30.00	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space)		
37.50-38.00	FIXED-SATELLITE (space-to-Earth)		
38.00-39.50	FIXED-SATELLITE (space-to-Earth)		

Frequency bands (GHz)	Space radiocommunication services		
	Region 1	Region 2	Region 3
39.50-40.50	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)		
40.50-42.50	FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE		
47.20-50.20	FIXED-SATELLITE (Earth-to-space)		
50.40-51.40	FIXED-SATELLITE (Earth-to-space)		

2 that, for frequency assignments to which *resolves* 1 applies, and for which information concerning the bringing into use or bringing back into use of the frequency assignments is provided to the Bureau on or after 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution no later than 30 days after the end of the regulatory period specified in No. **11.44** or No. **11.49**, as applicable, or 30 days after the end of the bringing/bringing back into use period in No. **11.44C** or No. **11.49.2**, as applicable, whichever comes later;

3 that, for frequency assignments to which *resolves* 1 applies, and that were brought into use or brought back into use prior to 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution no later than 1 April 2025;

4 that, for frequency assignments to which *resolves* 1 applies, and that retain the remark to the Master Register entry that was added under *resolves* 5b) of Resolution **35 (WRC-19)**, the notifying administration shall communicate to the BR the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution at the same time the notifying administration communicates to the BR the required information under *resolves* 7 or 8, as applicable, from Resolution **35 (WRC-19)**;

5 that, for frequency assignments to which *resolves* 1 applies, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution three years after the date of submission in accordance with *resolves* 2 or 3 above, or if applicable, three years after the date of submission of the information required under *resolves* 7c) or 8c) from Resolution **35 (WRC-19)** as required under *resolves* 4 of this Resolution, and continue doing so on the anniversary date of submission every three years thereafter;

6 that, upon receipt of the required deployment information submitted in accordance with *resolves* 2, 3 or 4 above, the Bureau shall promptly make this information available "as received" on the ITU website;

7 that, if the information provided in any Annex 1 submission under *resolves* 2, 3, 4 or5 above shows a change in the altitude of the apogee or perigee of the space station of more than 3%, or a change of more than 1 degree in the angle of inclination of the orbital plane of the space station from the notified orbital plane(s) provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments, the notifying administration shall also submit to the BR, no later than 90 days after the deadline for the Annex 1 submission under *resolves* 2, 3, or 4 above, modifications to the

characteristics of the notified or recorded frequency assignments reflecting the revised parameters;

8 that, upon receipt of the modifications to the characteristics of the notified or recorded frequency assignments as referred to in *resolves* 6:

a) the BR shall promptly make this information available "as received" on the ITU website;

b) the BR, for the purpose of No. **11.43B**, shall retain the original dates of entry of the frequency assignments in the Master Register if:

i) BR reaches a favorable finding under No. **11.31**; and

ii) the modifications are limited to changes in the altitude of the apogee of the space station (Appendix **4** data item A.4.b.4.d), the altitude of the perigee of the space station (Appendix **4** data item A.4.b.4.e), and the angle of inclination of the orbital plane of the space station (Appendix **4** data item A.4.b.4.a), along with changes associated with not causing more interference or requiring more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available); and

iii) the notifying administration provides a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments (see Appendix **4** data item A.25.a);

c) the BR shall publish the information provided and its findings in the BR IFIC;

9 that BR shall, no later than 45 days before any deadline for submission by a notifying administration under *resolves* 2, 3, 4, 5 or 6, send a reminder to the notifying administration to provide the information required;

10 that, if a notifying administration fails to communicate the information required under *resolves* 2, 3, 4, 5 or 6, as appropriate, the BR shall promptly send to the notifying administration a reminder asking the administration to provide the required information within 30 days from the date of this reminder from the BR;

11 that, if a notifying administration fails to provide information after the reminder sent under *resolves* 9, the BR shall send to the notifying administration a second reminder asking it to provide the required information within 15 days from the date of the second reminder;

12 that, if a notifying administration fails to provide the required information under *resolves* 2, 3, 4, 5 or 6, as appropriate, following the reminders under *resolves10* and 11, the Bureau shall:

a) inform the RRB, at the RRB's next scheduled meeting, that the Bureau intends to discontinue taking the entry in the Master Register into account when conducting its examinations;

b) in the absence of a determination by the RRB to reject or postpone the course of action outlined in *resolves* 12*a)* at the first RRB meeting after the Bureau provides

the information in *resolves* 12*a)*, no longer consider the frequency assignments under subsequent examinations under Nos. 9.36, 11.32 or 11.32A, and inform administrations having frequency assignments subject to Sub-Section IA of Article 9 that those assignments shall not cause harmful interference to, nor claim protection from, other frequency assignments recorded in the Master Register with a favourable finding under No. 11.31;

13 that the suspension of the use of frequency assignments in accordance with No. 11.49 at any point prior to a reporting deadline as specified in *resolves* 2, 3, 4 or 5 of this Resolution, as applicable, shall not alter or reduce the requirements associated with any reporting obligations as stated in this Resolution;

14 that, if information provided by a notifying administration under *resolves* 4 of this Resolution results in any satellites not retaining their original dates of entry in the Master Register after application of *resolves* 8 of this Resolution, such satellites shall not be included in the total number of satellites deployed as part of the system during any relevant milestone period;

15 that nothing in this Resolution, including *resolves* 6 above, shall be considered to limit or constrain the Bureau from implementing or following the procedure set forth in No. 13.6 of the Radio Regulations upon receipt of any Annex 1 submission under *resolves* 2, 3 or 4 above, or at any other time, with respect to the bringing into use, bringing back into use, or continuation in use of frequency assignments to non-GSO space stations in accordance with the notified required characteristics of a notified orbital plane as specified in Appendix **4**,

instructs the Radiocommunication Bureau

1 to take the necessary actions to implement this Resolution;

2 to report any difficulties it encounters in the implementation of this Resolution to WRC-27,

invites ITU-R

to continue studies with a view to identifying a methodology or methodologies for determining whether specific changes to a notified orbital plane will cause more interference or require more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments.

ANNEX 1 TO DRAFT NEW RESOLUTION [B7(A)] (WRC-23)

Information to be submitted about the deployed space stations

A Satellite system information

1) Name of the satellite system

2) Name of the notifying administration

3) Country symbol

4) Reference to the advance publication information or the request for coordination, or the notification information, if available

5) Total number of space stations deployed into each notified orbital plane of the satellite system with the capability of transmitting or receiving the frequency assignments

6) Orbital plane number indicated in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments into which each space station is deployed.

B Space station characteristics for each space station deployed

1) Name of the space station

2) Orbital plane number with which the space station is associated

3) Altitude of the apogee of the space station and angle of inclination of the orbital plane of the space station If there is no variance from the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) in either altitude of the apogee or angle of inclination of the orbital plane in all space stations covered by the submission, the notifying administration may indicate "No Variance" in its response here, and skip the remaining steps below.

4) For each space station operating in an orbital plane with an altitude of the apogee/perigee or angle of inclination at variance from the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available), by an amount less than or equal to a threshold in *resolves 7* of this Resolution, a detailed explanation of why there is a change in the orbital characteristics of the space station

5) For each space station operating in an orbital plane with an altitude of the apogee/perigee or angle of inclination at variance from the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) by an amount greater than a threshold level in *resolves* 7 of this Resolution, a detailed explanation of why there is a change in the orbital characteristics of the space station and a technical showing to support a determination that the variance does not result in any increased interference or protection requirements as compared to those requirements for operation without the variance.

C Commitment of non-interference/non-protection

By providing a submission under Annex 1 to this Resolution, the notifying administration commits that the operation of its notified frequency assignments using the orbital characteristics of the submission that are at variance with the notified orbital plane(s) will not cause more interference or require more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments to the non-geostationary-satellite system.

Reasons: To provide a mechanism to ensure that deviations in key orbital parameters from what is notified and/or recorded in the MIFR are transparent, reasonably up to date, and cause no change in the interference environment in which the non-GSO system operates.

MOD USA/7A/6

APPENDIX 4 (REV.WRC-19)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

Footnotes to Tables A, B, C and

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Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II	Notification or coordination of a geostationary-satellite network (including	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
***												
A.23	**COMPLIANCE WITH RESOLUTION 35 (WRC-19)**										**A.23**	
A.23.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.23.a	
***												
A.25	**COMPLIANCE WITH RESOLUTION [B7(A)] (WRC-23)**										**A.25**	
A.25.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.25.a	

Reasons: Consequential

VIEW B

View B: Agenda Item 7, Topic A (Tolerances for certain orbital characteristics of non-GSO space stations of the FSS, BSS or MSS)

SpaceX and OneWeb support a proposal under Topic A for Agenda item 7 based on Method A2 of the CPM text. Under this proposal, a fixed altitude tolerance of 100 km and inclination tolerance of 3 degrees would be applied to all NGSO systems. The tolerance would provide an envelope within which the United States could continue to license and manage its NGSO systems.

The FCC has licensed SpaceX to operate satellites with an orbital tolerance of 50 km below their filed altitude and up to 70 km above their filed altitude, with the current partial grant allowing 55 km above their filed altitude for specific orbital shells. Kepler was allowed 100 km tolerance, i.e. between 500 and 600 km. A 100 km tolerance, while meeting the needs of currently operational US-licensed systems, will give the FCC further flexibility to license multiple systems within similar altitudes without requiring one of the NGSO systems to operate outside of its ITU filing, with the dire consequences associated with that. The spirit of this work on orbital tolerances is not to overregulate and to guarantee the needed flexibility.

There are multiple reasons that an operator may require flexibility in altitude tolerance, such as to maintain a separation between its own orbital planes to minimize the potential for collisions amongst its own fleet, as well as to manage the effect of atmospheric drag and solar activity on space stations.

A single percentage, as compared to the fixed tolerance proposed herein, has the disadvantage of affording a restrictive tolerance for LEOs, and a very relaxed tolerance for MEOs and other systems in higher orbits. This biased approach is not justified on technical grounds.

There can be multiple ITU filings at a single GSO orbital location. One satellite operator having an ITU filing, notified and brought into use at 101 W with any station keeping tolerance, does not prevent any other operator or administration from filing precisely at 101 W. The same situation applies for NGSO systems – one system being filed in a orbital range does not prevent others. On the contrary, a very restrictive tolerance, e.g. 20-30 km, may actually result in single system blocking that volume of space, which is exactly the opposite of what this work on tolerances should achieve.

For GSO systems, flexibility is required in ITU filing tolerance to allow multiple systems to be accommodated at a single GSO orbital location. At 101 W, for example, the FCC has authorized multiple satellites: an SES satellite, a Ligado MSS satellite, and several DIRECTV satellites. It is not possible to enable all of them to operate at 101 W and to still overlap (much less be wholly within as being considered for NGSO systems!) their ITU filed station keeping box (generally +/- 0.1 degrees under Article 22, or 101 W +/- 0.1 degrees). Luckily, the DIRECTV satellites are subject to a more flexible ITU filing tolerance regime and thus can be operated outside of the other's ITU filed station keeping boxes. Because Appendix 30, which the DIRECTV satellites operate under, has a cluster concept for Region 2 which allows the satellites to be centered within +/- 0.2 degrees of 101 W! That ITU flexibility enabled the collocation of all those GSO satellites.

Similar to the GSO case, to accommodate multiple NGSO systems over time, the United States will need flexibility in the allowed ITU filed tolerance. It is difficult to predict today what flexibility the United States may require in the future. A tighter tolerance, or highly restrictive process associated with even the tolerances the FCC allows it operators to deploy today, will prevent new entrants, undermine the US space industry and hamstring the ability of the United States to manage its NGSO systems in the future. 100 km is considered to be a perfect compromise that ensures flexibility while preventing abuse of the rules, e.g. for BIU purposes.

IWG-4/Document 52r1
Date: March 20, 2023
Prepared by: SpaceX / OneWeb

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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

Topic 7A: Orbital tolerances for non-GSO systems

BACKGROUND: Resolution **86 (Rev.WRC-07)** invites future Conferences to consider any proposals which deal with deficiencies and improvements in the relevant procedures of the Radio Regulations for frequency assignments pertaining to space services which have either been identified by the Radio Regulations Board and included in the Rules of Procedure or by administrations or the BR. Future Conferences should ensure that these procedures and the related Appendices of the Radio Regulations reflect the latest technologies.

Issue A of Agenda item 7 at WRC-19 considered bringing into use (BIU) of frequency assignments to all non-GSO systems, as well as a milestone-based approach for the deployment of non-GSO systems in specific frequency bands and services. When deciding upon this issue, adopting a new milestone-based approach for the deployment of non-GSO satellite systems in Resolution 35 (WRC-19), WRC-19 invited ITU-R to study, "as a matter of urgency, tolerances for certain orbital characteristics of non-GSO space stations of the fixed-satellite, mobile-satellite or broadcasting-satellite services to account for potential differences between the notified and deployed orbital characteristics for 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."

This Topic A for WRC-23 looks to advance the work on defining appropriate ITU-level orbital tolerances for non-GSO systems. The responsibility to determine orbital tolerances should ultimately lie with National Administrations, while the ITU Radiocommunication Bureau needs orbital tolerance data to verify compliance with BIU / BBIU and Resolution 35.

The following proposal, based on Method A2 of the draft CPM report, recognizes the complexity behind the determination of orbital tolerances for non-GSO systems, which involves taking into account numerous factors, including atmospheric drag, solar activity, the need to ensure safe flight of non-GSO satellites to minimize the potential for orbital debris and the need to accommodate multiple systems. It is difficult to design an equation that could determine appropriate orbital tolerances for every non-GSO system. The role of the ITU is to define an upper bound for what constitutes operating within an ITU filing. Administrations then have the flexibility within this ITU upper bound to apply requirements as needed to accommodate multiple systems and to determine and verify orbital tolerance of individual non-GSO systems. As the non-GSO FSS industry is in nascent stages, administrations need flexibility to be able to operate their systems within their ITU filings, and to reach agreements, outside of the Radio Regulations which only deal with radio frequency interference, with other administrations regarding the physical co-existence of multiple non-GSO systems. Overly restrictive ITU

tolerances will prohibit administrations from accommodating multiple systems within similar orbital altitude ranges. As more experience is gained with non-GSO system operation, the ITU upper-bound tolerances may be adjusted in the future.

Proposal:

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7] (WRC-19)

Section II − Examination of notices and recording of frequency assignments in the Master Register

USA/7A/1

MOD

11.44C A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service, the mobile-satellite service or the broadcasting-satellite service shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the notified orbital plane(s)[MOD 27] of the non-geostationary satellite network or system for a continuous period of 90 days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, 28, 29]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-~~19~~23)

Reasons: To add reference to a modified footnote.

USA/7A/2

MOD

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[27] **11.44C.1** and **11.44D.1** For the purposes of No. **11.44C** or No. **11.44D**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.5.c (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For the purposes of No. **11.44C**, Resolution **[A7(A)-NGSO-FSS-BSS-MSS-Tolerance] (WRC-23)** also applies for space stations of a non-GSO FSS, BSS or MSS system. (WRC-~~19~~23)

Reasons: To add reference to a new Resolution to address orbital tolerances for certain non-GSO systems for the purposes of bringing into use.

USA/7A/3

MOD

11.49 Wherever the use of a recorded frequency assignment to a space station of a satellite network or to all space stations of a non-geostationary-satellite system is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of Nos. **11.49.1**, **11.49.2**, **11.49.3** or **11.49.4**, as applicable, so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available as soon as possible on the ITU website and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use[32, 33, 34, 35, MOD 36] shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. Ninety days before the end of the period of suspension, the Bureau shall send a reminder to the notifying administration. If the Bureau does not receive the declaration of the commencement of the bringing back into use period within thirty days following the limit date of the period of suspension established in accordance with this provision, it shall cancel the entry in the Master Register. The Bureau shall, however, inform the administration concerned before taking such action. (WRC-19)

Reasons: To add reference to a modified footnote.

USA/7A/4

MOD

[36] **11.49.5** For the purposes of Nos. **11.49.2** and **11.49.3**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.5.c (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For the purposes of No. **11.49.2**, Resolution **[A7(A)-NGSO-FSS-BSS-MSS-Tolerance] (WRC-23)** also applies for space stations of a non-GSO FSS, BSS or MSS system. (WRC-~~19~~23)

Reasons: To add reference to a new Resolution to address orbital tolerances for certain non-GSO systems for bringing back into use.

Section III – Maintenance of the recording of frequency assignments to non-geostationary-satellite systems in the Master Register (WRC-19)

USA/7A/5

MOD

11.51 For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **35 (WRC-19)** and Resolution **[A7(A)-NGSO-FSS-BSS-MSS-Tolerance] (WRC-23)** for space stations of a non-GSO FSS, BSS or MSS system shall apply. (WRC-~~19~~23)

Reasons: To add reference to a new Resolution to address orbital tolerances for certain non-GSO systems in the context of milestones.

USA/7A/6

ADD

DRAFT NEW RESOLUTION [A7(A)-NGSO-FSS-BSS-MSS-TOLERANCE-OPTION A] (WRC-23)

Tolerances for certain orbital characteristics of space stations deployed as part of non-GSO FSS, BSS or MSS systems

The World Radiocommunication Conference (Dubai, 2023),

considering

that WRC-19 invited ITU-R to study, as a matter of urgency, tolerances for certain orbital characteristics of the non-geostationary-satellite orbit (non-GSO) space stations of the fixed-satellite service (FSS), the broadcasting-satellite service (BSS) and the mobile-satellite service (MSS) to account for the potential differences between the notified and deployed orbital characteristics for 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,

noting

that, for the purposes of this Resolution, tolerances refer to the maximum variations allowed between the value notified and/or recorded for the orbital characteristics referred to in the

considering above and those associated with the actual deployment of satellites of the non-GSO FSS, BSS or MSS under consideration,

recognizing

a) that the use of frequency assignments to non-GSO FSS, BSS and MSS are subject to the regulatory and operational limits stipulated in the Radio Regulations;

b) that Nos. **11.44C**, **11.49.2** and **11.51** require the deployment of satellites on notified orbital planes;

c) that there are legitimate reasons for a satellite operating at a tolerance from its associated ITU filing, such as maintaining separation between satellites in the same system to minimize the risk of collisions, or with satellites in another satellite system;

d) that determination of orbital tolerances for a non-GSO system is a complex exercise which should take into account several factors;

e) that the orbital tolerance in this Resolution defines the maximum orbital tolerance acceptable for a non-GSO system to be considered as operating within its notified orbital characteristics and does not preclude coordination requests or notification filings under Articles 9 and 11 of the Radio Regulations for other non-GSO systems at the same altitude and tolerance;

f) that administrations and their operators may stablish separate operational arrangements regarding coexistence of the physical orbits of satellite systems and networks, including satellites in geostationary satellite orbits and non-GSO, and that such arrangements are not addressed by the ITU Radio Regulations which deal with avoidance of harmful interference due to radio frequency usage,

resolves

1 that for space stations deployed as part of a non-GSO FSS, BSS or MSS system with an eccentricity[1] less than 0.5 with frequency assignments in the frequency bands and services listed in the Table in Resolution 35 (WRC-19), *resolves* 1;

a) the maximum variation $\Delta alt_{Observed}$ allowed for the altitude, shall not exceed $\Delta alt_{Allowed}$ (see the Annex);

b) the maximum variation Δi allowed for the inclination shall not exceed 3 degrees (see the Annex)

2 that, for systems brought into use after 16 December 2023, if all the space stations referred to in a submission to the Bureau under Nos. **11.44C** or **11.49.2** for a non-GSO FSS, BSS or MSS satellite system exceed the tolerances referred to in *resolves* 1, this submission shall not be considered as compliant with Nos. **11.44C** or **11.49.2** accordingly;

3 that, after 1 January 2025, if any of the space stations referred to in a submission to the Bureau under No. **11.51** for satellite non-GSO FSS, BSS or MSS systems exceed the tolerances referred to in *resolves* 1 for any period of more than 180 consecutive days, that space station shall not be considered in the count of the satellites deployed provided under No. **11.51**;

4 that, notwithstanding the tolerances referred to in *resolves 1*, any space station deployed as part of a non-GSO FSS, BSS or MSS system at altitude and with an inclination other than the notified altitude or the notified inclination, shall not cause more interference nor require more protection than if the space station was deployed at the notified altitude and the notified inclination,

[1] The eccentricity is = (a - b) / (a + b), where a is the length of the semi-major axis of the elliptical orbit and b is the length of the semi-minor axis of the orbit.

instructs the Radiocommunication Bureau

to take the necessary actions to implement this Resolution.

ANNEX TO DRAFT NEW RESOLUTION [A7(A)-NGSO-FSS-BSS-MSS-TOLERANCE-OPTION A] (WRC-23)

Determination of the variation for the altitude and the inclination

1 The variation $\Delta alt/alt_n$ observed for the altitude of a non-GSO satellite is equal to:

$$\Delta alt_{Observed} = |alt_d - alt_n| \text{ in kilometres}$$

where:

alt_d: is the observed altitude in kilometres of the deployed satellite at the perigee

alt_n: is the altitude of the perigee in kilometres of the associated notified non-GSO system.

2 The allowed variation $\Delta alt_{Allowed}$ for the altitude of a non-GSO satellite is equal to:

$$\Delta alt_{Allowed} = 100 \text{ kilometres}$$

3 The variation Δi observed for the inclination of a non-GSO satellite is equal to:

$$\Delta i = i_d - i_n \quad \text{in degrees}$$

where:

i_d is the observed inclination in degrees of the deployed satellite

i_n is the inclination in degree of the associated notified non-GSO system.

Reasons: to add a new Resolution identifying to which non-GSO systems orbital tolerances are applied, and to specify those tolerances.

View of IWG-4 on NTIA/RCS Proposal for Agenda Item 7, Topic B

At its 17th meeting on February 16, 2023, IWG-4 endorsed the NTIA/RCS proposal for WRC-23 Agenda Item 7, Topic B (Doc. WAC/107 and IWG-4/045, pp. 20-21) without change.

View of IWG-4 on NTIA/RCS Proposal for Agenda Item 7, Topic C

At its 19th meeting on March 21, 2023, IWG-4 endorsed the NTIA/RCS proposal for WRC-23 Agenda Item 7, Topic C (Doc. WAC/108 and IWG-4/056, pp. 41-43) without change.

United States of America

draft proposals for the work of the Conference

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;*

7(D2) Topic D2 – New RR Appendix 4 parameters for Recommendation ITU-R S.1503 updates

Background Information: WRC-23 agenda item 7 Topic D2 addresses modification of RR Appendix **4** data items to support implementation of agreed revisions to Recommendation ITU-R S.1503-3.

ITU-R has been working on changes to Recommendation ITU-R S.1503-3 titled "Functional description to be used in developing software tools for determining conformity of non-geostationary-satellite orbit fixed-satellite service systems or networks with limits contained in Article **22** of the Radio Regulations." Some of the agreed changes require additional or modified RR Appendix **4** data items in order to be implemented in practice. Therefore, it was proposed to develop draft CPM text to cover these changes, assuming a revision to Recommendation ITU-R S.1503-3 is adopted by Study Group 4.

Note: ITU-R discussions on revisions to Recommendation ITU-R S.1503-3 will continue at the July 2023 meeting of ITU-R Working Party 4A. There have been no agreements on which elements will be submitted to SG4 as part of updates to Recommendation ITU-R S.1503-3. These discussions could lead to additions or deletion to the Appendix ***4*** *data items included in the proposal below.*

Proposal:

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APPENDIX 4 (REV.WRC-19)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

Footnotes to Tables A, B, C and D

[2] The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Space Services). (WRC-12)

MOD USA/7D2/1

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION (Rev.WRC-~~19~~23)

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14	**FOR STATIONS OPERATING IN A FREQUENCY BAND SUBJECT TO Nos. 22.5C, 22.5D, 22.5F OR 22.5L: SPECTRUM MASKS**										**A.14**	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.b.6	the mask pattern defined in terms of the power in the reference bandwidth as a function of latitude and the off-axis angle between the non-geostationary earth station boresight line and the line from the non-geostationary earth station to a point on the GSO arc or as a function of latitude, the non-geostationary earth station pointing angles (azimuth, elevation) and the difference in longitude between the non-geostationary earth station and a point on the geostationary arc					**X**					A.14.b.6	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.c.4	the type of mask, among one of the following types: (Earth-based exclusion zone angle, difference in longitude, latitude), ~~(satellite-based exclusion zone angle, difference in longitude, latitude)~~ or (satellite azimuth, satellite elevation, latitude)					**X**					A.14.c.4	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.d	**For each set of non-geostationary-satellite system operating parameters** to be provided, if A.4.b.6*bis* indicates the use of an extended set of operating parameters *Note* – There could be different sets of parameters at different frequency bands, but only one set of operating parameters for any frequency band used by the non-geostationary-satellite system										A.14.d	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.d.x1	the minimum angle in degrees at the surface of the Earth between the lines to any two active non-GSO satellites. Mandatory if the value is non-zero.					±					A.14.d.x1	
A.14.d.x2	the minimum angle in degrees at the non-GSO satellite between the lines to any two active non-GSO Earth stations. Mandatory if the value is non-zero.					±					A.14.d.x2	
A.14.d.x3	the maximum number of non-geostationary earth stations tracked co-frequency by a non-geostationary satellite. If the maximum number of earth stations tracked at the satellite is not provided, the number of earth stations created for the EPFD(up) run will be used.					±					A.14.d.x3	
A.14.d.x4	The non-GSO satellite selection method, specified as highest epfd, track duration or alpha table	…	…	…	…	**X**	…	…	…	…	A.14.d.x4	…
A.14.d.x5	The likelihood of a non-geostationary satellite having an alpha angle in degrees that is less than or equal to a set of given value defined for a range of latitudes, where the alpha angle is the minimum topocentric angle between the line to a non-GSO satellite and the line to any point on the visible geostationary arc. Mandatory if the non-GSO satellite selection method (A.14.d.x4) is alpha table.					±					A.14.d.x5	

Reasons: To modify and add certain Appendix 4 data items to support implementation of agreed revisions to Recommendation ITU-R S.1503-3.

United States of America

DRAFT Proposals for the work of the conference

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;*

7(D3) Topic D3 - BR reminders for BIU and BBIU

Background Information: WRC-23 agenda item 7 Topic D3 addresses the establishment of reminders for confirming the bringing into use (or bringing back into use) of a satellite network or system under RR Nos. **11.44B**, **11.44C**, **11.49** (**11.49.1** and **11.49.2**), RR Appendices **30/30A** § 5.2.10 (20*bis* and 24*bis*) and RR Appendix **30B** § 8.17 (14*ter*).

To assist administrations in managing their ITU satellite system filings under the Radio Regulations, WRCs, RRB and the Radiocommunication Bureau (BR) have, over time, included in the RR or Rules of Procedures reminders for most of the provisions with strict time-limits for submission of mandatory information. Indeed, an unfortunate oversight in the application of the RR, e.g. missing a deadline for providing information, may jeopardize a satellite system project.

These reminders exist for most key provisions of the RR, under Nos. **9.47** or **9.62** (acknowledgement of receipt of a request for coordination or absence of reply or decisions on a coordination request), or Nos. **11.44** and **11.49** (bringing into use or bringing back into use of frequency assignments) or No. **11.47** (provisionally recorded assignments), but also under No. **13.6**, all footnotes referring to the payments under Decision 482, and under many similar other occurrences in the Appendices **30**/**30A** and **30B**, and numerous resolutions, as e.g. Resolution **35 (WRC-19)**.

One critical time-limit however does not yet include a formal BR reminder. This is the confirmation of bringing into use or bringing back into use of frequency assignments under RR Nos. **11.44B**, **11.44C**, **11.49** (**11.49.1** and **11.49.2**), RR Appendices **30/30A** § 5.2.10 (20*bis* and 24*bis*) and RR Appendix **30B** § 8.17 (14*ter*) where the notifying administration shall inform the Bureau within 30 days of the end of the 90-day period after the bringing into use or bringing back into use that a space station in the geostationary-satellite or non-geostationary-orbit having the capability to transmit or receive on that assigned frequency, has been deployed and maintained at the notified orbital position or one of the notified orbital planes, as appropriate, for a continuous period of 90 days.

The BR, as an internal practice, has been sending a message recalling the 90-day obligation under RR Nos. **11.44B** or **11.44C** to administrations informing them of their satellite system bringing into use. For the BR practice to be fully suitable, the message should be sent sufficiently early to the notifying administration to ensure a proper response within the regulatory time-frame, e.g. as soon as the date of receipt of the bringing or bringing back into use information. The dispatch of this message, depending on the resources of the BR, for some cases, has occurred almost at the end of the 120-day period which provides little flexibility to the notifying administration to respond to the BR message on time.

Proposal:

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7] (WRC-19)

Section II − Examination of notices and recording of frequency assignments in the Master Register

MOD USA/7D3/1

11.44B A frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of 90 days. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, 26, ADD 26*bis*]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. Resolution **40 (Rev.WRC-19)** shall apply. (WRC-~~19~~23)

Reasons: To add reference to a new footnote.

ADD USA/7D3/2

ADD 26*bis* **11.44B.3 and 11.44C.5** If the notifying administration may have commenced the 90-day bringing into use period within 120 days before the end of the seven-year regulatory period in No. **11.44**, but has not fulfilled the obligation to inform the Bureau under Nos. **11.44B** or **11.44C** as of the end of the seven-year regulatory period in No. **11.44**, the Bureau shall send the notifying administration a reminder of the obligation under Nos. **11.44B** or **11.44C** either at the end of the seven-year regulatory period or 15 days prior to the 30-day deadline in Nos. **11.44B** and **11.44C**, whichever is later. (WRC-23)

Reasons: To add a footnote that requests the Bureau to send reminders to administrations who may have commenced the BIU within 120 days before the end of the seven-year regulatory period with respect to the need to confirm the BIU if they have not yet done so.

MOD USA/7D3/3

11.44C A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service, the mobile-satellite service or the broadcasting-satellite service shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the notified orbital plane(s)[27] of the non-geostationary satellite network or system for a continuous period of 90 days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, ADD 26*bis*, 28, 29]. On receipt of the information sent under this provision, the Bureau shall make

that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-~~19~~23)

Reasons: To add a reference to a new footnote.

MOD USA/7D3/4

11.49 Wherever the use of a recorded frequency assignment to a space station of a satellite network or to all space stations of a non-geostationary-satellite system is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of Nos. **11.49.1**, **11.49.2**, **11.49.3** or **11.49.4**, as applicable, so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available as soon as possible on the ITU website and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use[32, ADD 32*bis*, 33, 34, 35, 36] shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. Ninety days before the end of the period of suspension, the Bureau shall send a reminder to the notifying administration. If the Bureau does not receive the declaration of the commencement of the bringing back into use period within thirty days following the limit date of the period of suspension established in accordance with this provision, it shall cancel the entry in the Master Register. The Bureau shall, however, inform the administration concerned before taking such action. (WRC-~~19~~23)

Reasons: To add a reference to a new footnote.

ADD USA/7D3/5

ADD 32*bis* **11.49.1*bis* and 11.49.2*bis*** If the notifying administration may have commenced the 90-day bringing back into use period within 120 days before the end of the suspension period in No. **11.49**, but has not fulfilled the obligation under No. **11.49.1** or **11.49.2**, as applicable, to inform the Bureau as of the end of the suspension period, the Bureau shall send the notifying administration a reminder of the obligation under No. **11.49.1** or **11.49.2**, as applicable, either at the end of the suspension period or 15 days prior to the 30-day deadline in No. **11.49.1** or **11.49.2**, whichever is later. (WRC-23)

Reasons: To add a footnote that requests the Bureau to send reminders to administrations who may have commenced the BBIU within 120 days before the end of the suspension period with respect to the need to confirm the BIU if they have not yet done so.

APPENDIX 30 (REV.WRC-19)*

Provisions for all services and associated Plans and List[1] for the broadcasting-satellite service in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2) (WRC-03)

ARTICLE 5 (REV.WRC-19)

Notification, examination and recording in the Master International Frequency Register of frequency assignments to space stations in the broadcasting-satellite service[18] (WRC-07)

A. 5.2 Examination and recording

MOD USA/7D3/6

5.2.10 Wherever the use of a frequency assignment to a space station recorded in the Master Register and emanating from the Regions 1 and 3 List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use[20*bis*, ADD 20*ter*] shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. (WRC-~~19~~23)

Reasons: To add a reference to a new footnote.

ADD USA/7D3/7

ADD 20*ter* If the notifying administration may have commenced the 90-day bringing back into use period within 120 days before the end of the suspension period in § 5.2.10, but has not fulfilled the obligation under footnote 20*bis* to inform the Bureau as of the end of the suspension period, the Bureau shall send the notifying administration a reminder of the obligation under footnote 20*bis* either at the end of the suspension period or 15 days prior to the 30-day deadline in footnote 20*bis*, whichever is later. (WRC-23)

Reasons: To add a new footnote and add the footnote that requests the Bureau to send reminders to administrations who may have commenced the BBIU within 120 days before the end of the suspension period with respect to the need to confirm the BIU if they have not yet done so.

APPENDIX 30A (REV.WRC-19)*

Provisions and associated Plans and List[1] for feeder links for the broadcasting-satellite service (11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3) in the frequency bands 14.5-14.8 GHz[2] and 17.3-18.1 GHz in Regions 1 and 3, and 17.3-17.8 GHz in Region 2 (WRC-03)

ARTICLE 5 (REV.WRC-19)

Coordination, notification, examination and recording in the Master International Frequency Register of frequency assignments to feeder-link transmitting earth stations and receiving space stations in the fixed-satellite service[21, 22] (WRC-19)

B. 5.2 Examination and recording

MOD USA/7D3/8

5.2.10 Wherever the use of a frequency assignment to a space station recorded in the Master Register and emanating from the Regions 1 and 3 List is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use[24*bis*, ADD 24*ter*] shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the

suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. (WRC-~~15~~23)

Reasons: To add a reference to a new footnote.

ADD USA/7D3/9

ADD 24*ter* If the notifying administration may have commenced the 90-day bringing back into use period within 120 days before the end of the suspension period in § 5.2.10, but has not fulfilled the obligation under footnote 24*bis* to inform the Bureau as of the end of the suspension period, the Bureau shall send the notifying administration a reminder of the obligation under footnote 24*bis* either at the end of the suspension period or 15 days prior to the 30-day deadline in footnote 24*bis*, whichever is later. (WRC-23)

Reasons: To add a footnote that requests the Bureau to send reminders to administrations who may have commenced the BBIU within 120 days before the end of the suspension period with respect to the need to confirm the BIU if they have not yet done so.

APPENDIX 30B (REV.WRC-19)

Provisions and associated Plan for the fixed-satellite service in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz, 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz

ARTICLE 8 (WRC-15)

Procedure for notification and recording in the Master Register of assignments in the planned bands for the fixed-satellite service[11, 12] (WRC-19)

MOD USA/7D3/10

8.17 Wherever the use of a recorded frequency assignment to a space station is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it

in the BR IFIC. The date on which the assignment is brought back into use[14*ter*, ADD 14*quater*] shall be no later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled from the Master Register and the Bureau shall apply the provisions of § 6.33. (WRC-~~19~~23)

Reasons: To add a reference to a new footnote.

ADD USA/7D3/11

ADD 14*quater* If the notifying administration may have commenced the 90-day bringing back into use period within 120 days before the end of the suspension period in § 8.17, but has not fulfilled the obligation under footnote 14*ter* to inform the Bureau as of the end of the suspension period, the Bureau shall send the notifying administration a reminder of the obligation under footnote 14*ter* either at the end of the suspension period or 15 days prior to the 30-day deadline in footnote 14*ter*, whichever is later. (WRC-23)

Reasons: To add a footnote that requests the Bureau to send reminders to administrations who may have commenced the BBIU within 120 days before the end of the suspension period with respect to the need to confirm the BIU if they have not yet done so.

WRC-23 Agenda Item 7
Topic J - *MODs to Res. **76 (Rev.WRC-15)***

IWG-4 members were not able to reach consensus on a draft U.S. proposal for WRC-23 Agenda Item 7, Topic J (MODs to Res. **76 (Rev.WRC-15))**. This document provides two views on the appropriate regulatory changes the FCC should support.
View A is supported by: Amazon, Mangata, and SpaceX

View B is supported by: Intelsat and EchoStar

VIEW A

View A:

Agenda Item 7, Topic J (MODs to Res. 76 (Rev.WRC-15))

Reference: IWG-4/039 (13.12.2022)

Supported by Amazon, Mangata, and SpaceX
This proposal, which closely aligns with the NTIA/RCS proposal in Doc. IWG-4/045, seeks to modify Resolution **76 (Rev.WRC-15)** to call for ITU-R studies ahead of WRC-27 to establish a consultation procedure for use by operational non-GSO systems to ensure that there are no exceedances of the aggregate epfd limits in the Resolution for the 12/14 GHz and 30/20 GHz bands subject to epfd limits. The adoption of a procedure at WRC-23, as proposed in View B, is premature for three reasons: 1) Resolution **76 (Rev WRC-15)** *invites the ITU Radiocommuncation sector 1*-3 calls upon the ITU-R to develop a methodology containing procedures to accurately model non-GSO systems and establish a methodology on procedures to be used to evaluate the aggregate EPFD limits; 2) as recognized in the CPM text for this agenda item, there is no methodology in the ITU-R, called upon and essential to the procedure, on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the subject frequency bands; and 3) there is a potential FAI that would look at revising the limits to remove some overly-conservative elements dating back to the adoption of the limits at WRC-2000 without altering the protection provided to GSO FSS and BSS networks. The development of the methodology is an essential prerequisite to the success of the procedure and initiation of consultation meetings, and is duly promoted in the draft View A version of the revised Res. **76**. The FAI could, if adopted, lead to a revision of Res. **76**, and could have an impact on how the procedure is established. The picture on both scores will be clear by WRC-27, and that's where the procedure should be established.
The View A proponents note further that while there will be some further deployment of non-GSO FSS systems in the Res. **76** bands between WRC-23 and WRC-27, there will not be full deployment in a way that makes it urgent for WRC-23 to act on the consultation procedure itself. In any event, the obligation to ensure that the aggregate limits are respected is in place today in Res. **76** and associated RR No. **22.5K**, so the urgency is not there for WRC-23 action for this reason as well.
The organizations and companies listed above urge FCC to adopt the attached draft proposal for WRC-23 Agenda Item 7, Topic A.

ATTACHMENT TO VIEW A:

Document IWG-4/039
Date: December 13, 2022
Prepared by: Alex Epshteyn (Amazon)

UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7, Topic J

*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;*

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

Background:

Resolution **76 (Rev.WRC-15)** calls for the development of Recommendations on accurate modelling of interference as well as the procedures to be used amongst administrations to ensure that the aggregate equivalent power flux-density (epfd) limits are not exceeded. While the aggregate epfd limits are specified in Tables 1A to 1D of the Resolution, there is no clear methodology nor procedures outlined in Resolution **76 (Rev.WRC-15)** for the involved administrations to collaboratively determine whether these aggregate levels are exceeded. WRC-23 Agenda Item 7, Topic J calls for consideration of modifications to Resolution **76 (Rev.WRC-15)** to facilitate the development of a consultation process to ensure that operating non-GSO FSS systems do not exceed the aggregate epfd limits in Resolution **76 (Rev.WRC-15)**. Resolution **76 (WRC-15)** also invites the ITU-R to study and develop a suitable methodology for calculating the aggregate epfd produced from all non-GSO systems operating or planning to operate co-frequency in the relevant frequency bands.

It is recognized that whereas all administrations that operate or plan to operate non-GSO FSS should collaborate to ensure the aggregate epfd remains below the levels in Tables 1A to 1D, this is not simply a theoretical exercise whereby single-entry epfd levels from all satellite filings as verified by the Bureau would simply be aggregated, but rather, as recognized by Resolution 76, the aggregate calculations must be based on realistic parameters and, assumptions on accurate modelling of interference. As recognized in the CPM text for this agenda item, "there is no recent and comprehensive ITU-R Recommendation[35] which takes into account accurate modelling of interference from multiple non-GSO systems for the purposes of assessing compliance with aggregate epfd limits, nor is there a methodology or procedures for the administrations involved to collaboratively determine whether these aggregate levels are exceeded." Thus, a necessary prerequisite to the proper functioning of any consultation process is the establishment of an accurate technical foundation as proposed in CPM Method J5.

The concept of a "consultation process/meetings" has been established in other regulatory frameworks – specifically, in Resolutions **769 (WRC-19)** and **609 (Rev.WRC-07)** – to provide a

[35] It is noted that Recommendation ITU-R S.1588, which calculates aggregate epfd levels, appears not to be sufficient for this purpose.

means for administrations to evaluate aggregate interference and assure compliance with aggregate interference limits between multiple systems (non-GSO in the case of Resolution **769 (WRC-19)** and non-GSO and GSO in the case of Resolution **609 (Rev.WRC-07)**). It is noted that the sharing scenarios and challenges for the frequency bands identified in Resolution **76 (Rev.WRC-15)** differ from those included in the frequency bands identified in Resolution **769 (WRC-19)** and Resolution **609 (Rev.WRC-07)**.

The proposals below modify and update Resolution **76 (Rev.WRC-15)** to call specifically for further study and development of a technical basis for a consultation process for non-GSO FSS systems operating in the frequency bands specified in *considering* a) of the Resolution to ensure compliance with the aggregate epfd limits in Tables 1A to 1D of the Resolution. This proposal is based on CPM Method J5.

Proposals:

MOD USA-4/7J/1

RESOLUTION 76 (REV.WRC-~~15~~23)

Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

The World Radiocommunication Conference (~~Geneva~~Dubai, 20~~15~~23),

considering

a) that WRC-97 adopted, in Article **22**, provisional equivalent power flux-density (epfd) limits to be met by non-geostationary fixed-satellite service (non-GSO FSS) systems in order to protect GSO FSS and GSO broadcasting-satellite service (BSS) networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 revised Article **22** to ensure the limits contained therein provide adequate protection to GSO systems without placing undue constraints on any of the systems and services sharing these frequency bands;

c) that WRC-2000 decided that a combination of single-entry validation, single-entry operational and, for certain antenna sizes, single-entry additional operational epfd limits, contained in Article **22**, along with the aggregate limits in Tables 1A to 1D as contained in Annex 1 to this Resolution, which apply to non-GSO FSS systems, protects GSO networks in these frequency bands;

d) that these single-entry validation limits have been derived from aggregate epfd masks contained in Tables 1A to 1D, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these frequency bands into GSO FSS systems should not exceed the aggregate epfd levels in Tables 1A to 1D;

f) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in the frequency bands in question are to mutually coordinate the use of frequencies in these frequency bands under the provisions of No. **9.12**;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) that, as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems will not be directly related to the actual number of systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small;

i) that the possible misapplication of single-entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to mutually share frequencies;

b) that, on account of the use of such interference mitigation techniques, it is likely that the number of non-GSO systems will remain small, as will the aggregate interference caused by non-GSO FSS systems into GSO systems;

c) that, notwithstanding *considering d)* and *e)* and *recognizing b)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Tables 1A to 1D;

d) that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Tables 1A to 1D,

noting

Recommendation ITU-R S.1588 "Methodologies for calculating aggregate downlink equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems into a geostationary fixed-satellite service network",

resolves

1 that administrations operating or planning to operate non-GSO FSS systems, for which coordination or notification information, as appropriate, was received after 21 November 1997, in the frequency bands referred to in *considering a)* above, individually or in collaboration, shall take all possible steps, including, if necessary, by means of appropriate modifications to their systems, to ensure that the aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not cause the aggregate power levels given in Tables 1A to 1D to be exceeded (see No. **22.5K**);

2 that, in the event that the aggregate interference levels in Tables 1A to 1D are exceeded, administrations operating non-GSO FSS systems in these frequency bands shall take all necessary measures expeditiously to reduce the aggregate epfd levels to those given in Tables 1A to 1D, or to higher levels where those levels are acceptable to the affected GSO administration (see No. **22.5K**),

invites the ITU Radiocommunication Sector

1 to continue its studies and to develop, as a matter of urgency, ~~as appropriate,~~ a suitable methodology ~~for~~to calculat~~eing~~ the aggregate epfd produced by all non-GSO FSS systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks, which may be used to determine whether the systems are in compliance with the aggregate power levels given in Tables 1A to 1D;

2 to continue its studies and to develop, as a matter of urgency, a Recommendation on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above, and taking into account the coordination of frequency use among non-GSO systems, in order to assist administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks, and to provide guidance to GSO network

designers on the maximum epfd↓ levels expected to be produced by all non-GSO FSS systems when accurate modelling assumptions are used;
3 to develop a Recommendation containing procedures to be used among administrations in order to ensure that the aggregate epfd limits given in Tables 1A to 1D are not exceeded by operators of non-GSO FSS systems;
4 to work on the ~~attempt to~~ development of measurement techniques to identify the interference levels from non-GSO systems in excess of the aggregate limits given in Tables 1A to 1D, and to confirm compliance with these limits,

instructs the Director of the Radiocommunication Bureau

1 to assist in the development of the methodology referred to in *invites the ITU Radiocommunication Sector* 1 above;
2 to report to a future competent conference on the results of studies in *invites the ITU Radiocommunication Sector* 1 and 3 above.

ANNEX 1 TO RESOLUTION 76 (REV.WRC-23~~15~~)

…

Reason: This method proposes to modify and update Resolution **76 (Rev.WRC-15)** to call specifically for further study on a consultation process for non-GSO FSS systems operating in the frequency bands specified in considering a) of the Resolution to use to ensure compliance with the aggregate epfd limits in Tables 1A to 1D of the Resolution.

MOD USA-4/7J/2

22.5K 8) Administrations operating or planning to operate non-geostationary-satellite systems in the fixed-satellite service in the frequency bands listed in Tables **22-1A** to **22-1D** of No. **22.5C** will apply the provisions of Resolution **76 (Rev.WRC-23~~15~~)** to ensure that the actual aggregate interference into geostationary fixed-satellite service and geostationary broadcasting-satellite service networks caused by such systems operating co-frequency in these frequency bands does not exceed the aggregate power levels shown in Tables **1A** to **1D** of Resolution **76 (Rev.WRC-~~15~~23)**. In the event that an administration operating a geostationary-satellite network in conformity with the Radio Regulations identifies equivalent power flux-density levels from nongeostationary-satellite systems in the fixed-satellite service which may be in excess of the aggregate limits contained in Tables **1A** to **1D** of Resolution **76 (Rev.WRC-23~~15~~)**, the administrations responsible for the non-geostationary-satellite systems in the fixed-satellite service will apply the provisions contained in *resolves* 2 of Resolution **76 (Rev.WRC-23~~15~~)**. (WRC-~~19~~23)

Reason: Consequential

VIEW B

View B:

Agenda Item 7, Topic J (MODs to Res. 76 (Rev.WRC-15))

Reference: IWG-4/041R1 (20.03.2023)

Supported by Intelsat and EchoStar
Resolution **76,** "*Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits*" was adoptedwas to ensure protection of GSO networks from NGSO networks in 12/14 GHz and 30/20 GHz bands subject to epfd limits and Annex 1 of this Resolution includes aggregate EPFD limits that must be met by all operatonal NGSO systems to ensure protection of GSO networks. Meeting these aggregage EPFD limits allows administratonn to fulfil their obligations under the RR.
While the aggregate epfd limits are specified in Tables 1A to 1D of the Resolution, and the obligation to comply with the limits is imposed on all administrations operating non-GSO FSS in RR No. **22.5K**, there has been no joint action by administration to demonstrate that these limits are being met, and the number of NGSO systems continues to grow. It is critical for the ITU community to ensure that the aggregate EPFD limits put in place to protect GSO networks are respected.
This proposal modifies and updates Resolution **76 (Rev.WRC-15)** to introduce a "consultation process/meetings" as a solution to ensure compliance with the aggregate EPFD limits in Tables 1A to 1D as contained in Annex 1 to this Resolution. The proposal also invites the ITU Radiocommunication Sector to continue its work on relevant methodologies required. It is incumbent on WRC-23 to adopt a framework for administration operating NGSO systems to demonstrate compliance with the mandatory aggregate EPFD limits in Resolution 76. The proposal in View A does not address the protection of GSO networks and merely kicks the can down the road until after WRC-27 although the number of NGSO systems, in some frequency bands, already exceeds the 3.5 systems that the aggregate EPFD limits were based on. The work in the ITU-R should continue but in parallel administrations need to at a minimum discuss the operations of their NGSO systems and provide some certainty to GSO networks that the aggregate EPFD limits are being respected.
The companies listed above urge the FCC to adopt the attached draft proposal for WRC-23 Agenda Item 7, Topic J.

ATTACHMENT TO VIEW B:

Document IWG-4/041R1
Date: 20 Mar 2023
Prepared by: Intelsat, Hughes Network Systems LLC

UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7, Topic J

*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;*

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

Background:

Resolution **76 (Rev.WRC-15)** calls for the development of Recommendations on accurate modelling of interference as well as the procedures to be used amongst administrations to ensure that the aggregate equivalent power flux-density (epfd) limits are not exceeded. While the aggregate epfd limits are specified in Tables 1A to 1D of the Resolution, there is no clear methodology nor procedures outlined in Resolution **76 (Rev.WRC-15)** for the involved administrations to collaboratively determine whether these aggregate levels are exceeded. WRC-23 Agenda Item 7, Topic J calls for consideration of modifications to Resolution **76 (Rev.WRC-15)** to facilitate the development of a consultation process to ensure that operating non-GSO FSS systems do not exceed the aggregate epfd limits in Resolution **76 (Rev.WRC-15)**. Resolution **76 (WRC-15)** also invites the ITU-R to study and develop a suitable methodology for calculating the aggregate epfd produced from all non-GSO systems operating or planning to operate co-frequency in the relevant frequency bands.

It is recognized that whereas all administrations that operate or plan to operate non-GSO FSS should collaborate to ensure the aggregate epfd remains below the levels in Tables 1A to 1D, this is not simply a theoretical exercise whereby single-entry epfd levels from all satellite filings as verified by the Bureau would simply be aggregated, but rather, as recognized by Resolution 76, the aggregate calculations must be based on realistic parameters and, assumptions on accurate modelling of interference. As recognized in the CPM text for this agenda item, "there is no recent and comprehensive ITU-R Recommendation[36] which takes into account accurate modelling of interference from multiple non-GSO systems for the purposes of assessing compliance with aggregate epfd limits, nor is there a methodology or procedures for the administrations involved to collaboratively determine whether these aggregate levels are exceeded."

The proposals below modify and update Resolution **76 (Rev.WRC-15)** to introduce the "consultation process/meetings" as a solution to ensure compliance with the aggregate EPFD limits in Tables 1A to 1D as contained in Annex 1 to this Resolution. The proposal also invites the ITU Radiocommunication Sector to develop, as a matter of urgency, a suitable methodology

[36] It is noted that Recommendation ITU-R S.1588, which calculates aggregate epfd levels, appears not to be sufficient for this purpose.

to adapt, in case of aggregate EPFD limits are exceeded, the operation of all non-GSO FSS systems to ensure that the aggregate power levels given in Tables 1A to 1D of Annex 1 are met. This proposal is based on CPM Method J3.

The concept of a "consultation process/meetings" has been established in other regulatory frameworks – specifically, in Resolutions **769 (WRC-19)** and **609 (Rev.WRC-07)** – to provide a means for administrations to evaluate aggregate interference and assure compliance with aggregate interference limits between multiple systems (non-GSO in the case of Resolution **769 (WRC-19)** and non-GSO and GSO in the case of Resolution **609 (Rev.WRC-07)**).

Proposals:

MOD USA-4/7J/1

RESOLUTION 76 (REV.WRC-~~15~~23)

Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

The World Radiocommunication Conference (~~Geneva~~Dubai, 20~~15~~23),

considering

a) that WRC-97 adopted, in Article 22, provisional equivalent power flux-density (epfd) limits to be met by non-geostationary fixed-satellite service (non-GSO FSS) systems in order to protect GSO FSS and GSO broadcasting-satellite service (BSS) networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 revised Article 22 to ensure the limits contained therein provide adequate protection to GSO systems without placing undue constraints on any of the systems and services sharing these frequency bands;

c) that WRC-2000 decided that a combination of single-entry validation, single-entry operational and, for certain antenna sizes, single-entry additional operational epfd limits, contained in Article 22, along with the aggregate limits in Tables 1A to 1D as contained in Annex 1 to this Resolution, which apply to non-GSO FSS systems, protects GSO networks in these frequency bands;

d) that these single-entry validation limits have been derived from aggregate epfd masks contained in Tables 1A to 1D of Annex 1, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these frequency bands into GSO FSS systems should not exceed the aggregate epfd levels in Tables 1A to 1D of Annex 1;

f) that to achieve the objective in considering e), administrations operating non-GSO FSS systems would need to establish in collaboration, through consultation meetings, the evaluation of aggregate interference levels of all concerned space stations and the implementation of measures to ensure that those non-GSO FSS space stations do not exceed the aggregate epfd levels for the protection of GSO FSS networks;

~~f~~g) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in the frequency bands in question are to mutually coordinate the use of frequencies in these frequency bands under the provisions of No. 9.12;

~~g~~h) that the orbital characteristics of such systems are likely to be inhomogeneous;

~~h~~i) that, as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems will not be directly related to the actual number of systems sharing a frequency band~~, and the number of such systems operating co-frequency is likely to be small~~;

~~i~~j) that the possible misapplication of single-entry limits should be avoided,

recognizing

a) that non-GSO FSS systems ~~are likely to~~may need to implement interference mitigation techniques to mutually share frequencies;

~~b) that, on account of the use of such interference mitigation techniques, it is likely that the number of non-GSO systems will remain small, as will the aggregate interference caused by non-GSO FSS systems into GSO systems;~~

~~.c~~b) that, notwithstanding considering d) and e)~~ and recognizing b)~~, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Tables 1A to 1D of Annex 1;

~~d~~c) that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in considering a) above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Tables 1A to 1D of Annex 1,

noting

Recommendation ITU-R S.1588 "Methodologies for calculating aggregate downlink equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems into a geostationary fixed-satellite service network",

resolves

1 that administrations operating or planning to operate non-GSO FSS systems, for which coordination or notification information, as appropriate, was received after 21 November 1997, in the frequency bands referred to in considering a) above, individually or in collaboration, shall take all possible steps, including, if necessary, by means of appropriate modifications to their systems, to ensure that the aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not cause the aggregate power levels given in Tables 1A to 1D of Annex 1 to be exceeded (see No. 22.5K);

2 that, in the event that the aggregate interference levels in Tables 1A to 1D of Annex 1 are exceeded, administrations operating non-GSO FSS systems complying with the applicable criteria indicated in Annex 2 in these frequency bands shall take all necessary measures expeditiously to reduce the aggregate epfd levels to those given in Tables 1A to 1D of Annex 1, or to higher levels where those levels are acceptable to the affected GSO administration (see No. 22.5K)~~,~~;

3 that administrations, evaluating aggregate power levels under resolves 1 and 2 above, shall take into account all those satellites included in the relevant information communicated to the Bureau under the applicable provisions of Resolution 35 (WRC-19) submitted by administrations operating non-GSO FSS systems complying with the applicable criteria indicated in Annex 2 in the frequency bands covered in Tables 1A to 1D of Annex 1 along with the relevant information provided to the consultation meetings referred to in considering f);

3bis that, in order to identify the non-GSO systems mentioned in resolves 3 above, the criteria listed in Annex 2 shall be used;

4 that administrations engaged in consultation meetings, in developing agreements to carry out their obligations under resolves 1 and 2 above, shall establish mechanisms to ensure that all administrations are given full visibility of the process;

5 that, since the limits of Tables 1A to 1D of Annex 1 were based on the assumption that 3.5 non-GSO FSS systems would operate simultaneously, once at least four non-GSO systems in each of the frequency bands indicated in Tables 1A to 1D of Annex 1 satisfy the applicable criteria included in Annex 2, the concerned administrations participating in this process of epfd should hold consultation meetings as needed;

5bis that administrations notifying GSO networks that meet the applicable criteria indicated in Annex 2 and operating in the frequency bands indicated in Tables 1A to 1D of Annex 1 can participate in the process mentioned in resolves 5 above.

5ter that consultation meetings should not take place earlier than when the methodologies mentioned in invites the ITU Radiocommunication Sector 1 and 2 are approved and made available to the membership, unless the criteria defined in resolve 5 are met and administrations notifying GSO networks that meet the applicable criteria indicated in Annex 2 and operating in the frequency bands indicated in Tables 1A to 1D of Annex 1 demonstrates that the aggregate epfd levels given in Tables 1A to 1D of Annex 1 may be exceeded;

5quaterthat the Terms of Reference included in Annex 3 shall be used to regulate the first consultation meeting mentioned in resolves 5 above;

6 that those administrations participating in the consultation meeting shall designate one administration that shall communicate to the Bureau the results of any technical or operational amendment to the relevant non-GSO FSS systems following the application of resolves 2 above;

7 that any amendment to the relevant non-GSO FSS systems mentioned in resolves 6 shall not affect the regulatory status of the affected non-GSO systems, including following any modifications to their published characteristics,

invites the ITU Radiocommunication Sector

1 to continue its studies and to develop-, as appropriate and as a matter of urgency, a suitable methodology for calculating the aggregate epfd produced by all non-GSO FSS systems that meet the applicable criteria indicated in Annex 2 operating ~~or planning to operate~~ co-frequency in the frequency bands referred to in considering a) above into GSO FSS and GSO BSS networks, which may be used to determine whether the systems are in compliance with the aggregate power levels given in Tables 1A to 1D of Annex 1, taking into account relevant elements of Recommendation ITU-R S.1588 and Recommendation ITU-R S.1503, as appropriate;

2 to develop, as a matter of urgency, a suitable methodology to adapt the operation of all non-GSO FSS systems that meet the applicable criteria indicated in Annex 2 operating co-frequency in the frequency bands referred to in considering a) above to ensure that the aggregate power levels given in Tables 1A to 1D of Annex 1 are met,

~~2 to continue its studies and to develop a Recommendation on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in considering a) above, in order to assist administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks, and to provide guidance to GSO network designers on the maximum epfd↓ levels expected to be produced by all non-GSO FSS systems when accurate modelling assumptions are used;~~

~~3 to develop a Recommendation containing procedures to be used among administrations in order to ensure that the aggregate epfd limits given in Tables 1A to 1D are not exceeded by operators of non-GSO FSS systems;~~

~~4 to attempt to develop measurement techniques to identify the interference levels from non-GSO systems in excess of the aggregate limits given in Tables 1A to 1D, and to confirm compliance with these limits,~~

~~instructs the Director of the Radiocommunication Bureau~~

~~1 to assist in the development of the methodology referred to in invites the ITU Radiocommunication Sector 1 above;~~

~~2 to report to a future competent conference on the results of studies in invites the ITU Radiocommunication Sector 1 and 3 above.~~

instructs the Radiocommunication Bureau

1 to participate in consultation meetings mentioned under resolves 6 and to observe carefully the results of the epfd calculation mentioned in resolves 5;

2 to publish in the International Frequency Information Circular (BR IFIC) the information referred to in resolves 6 and instructs the Radiocommunication Bureau 1.

ANNEX 1 TO RESOLUTION 76 (REV.WRC-~~15~~23)

…(no change)

ANNEX 2 TO RESOLUTION 76 (REV.WRC-23)

Criteria to identify non-GSO systems and GSO networks, as applicable, that shall be taken into account to evaluate the aggregate epfd levels, in compliance with resolves 1 and 2

A Criteria for non-GSO systems

1 Submission of appropriate Notification information under No. 11.2 of the Radio Regulations; and

2 Submission of the information referred to in resolves 2, 3, 7 and/or 8, as applicable, of Resolution 35 (WRC-19).

B Criteria for GSO networks

1 Submission of appropriate Notification information under No. 11.2 of the Radio Regulations; and,

2 Submission of the information referred to in No. 11.44B of the Radio Regulations.

ANNEX 3 TO RESOLUTION 76 (REV. WRC-23)

Terms of Reference regulating the first Consultation Meetings taking place in application of resolves 5

1 Consultation Meetings between administrations operating non-GSO systems in the fixed-satellite service (FSS) in the frequency bands will be held in accordance with this Resolution. These meetings will ensure that the epfd produced by all non-GSO satellite systems operating does not exceed the relevant limits specified in Annex 1 to this Resolution.

2 The notifying administrations of GSO operators can participate in the Consultation Meetings in compliance with resolves *5bis* of this Resolution. The Bureau can participate in the Consultation Meetings as observer and shall also carry out the functions assigned to it in the instructs the Director of the Radiocommunication Bureau 1 and 2 of this Resolution.

3 For each Consultation Meeting, a convening administration is appointed. The appointment is made at the end of the previous Consultation Meeting and decided by the administrations of those systems under which the participating non-GSO systems operate. The convening administration is responsible for:

a) Organizing the work to be conducted during the Consultation Meeting; and

b) Preparing a draft summary record of the Consultation Meeting and a report containing the results, for discussion and approval by the participating administrations with the final report approved and submitted to the Bureau not later than 45 days after the end of the meeting.

4 No later than six (6) months before the Consultation Meeting, the convening administration shall provide participants with practical information about the meeting venue;

5 No later than six (6) months before the Consultation Meeting, the Bureau should provide the participants with a list of non-GSO systems and GSO networks submitted under No. 11.2 of

the Radio Regulations and having assignments in the subject frequency bands. The Bureau shall also indicate the worst-case geometry configuration, relevant for the computation of the single-entry epfd limits and computed in accordance with Recommendation ITU-R S.1503, for each of these systems.

6 No later than four (4) months before the Consultation Meeting, taking into account the criteria included in Annex 2 to this Resolution, administrations should indicate which of its non-GSO satellite systems and GSO networks shall be taken into account in the Consultation Meetings. For each of these systems and networks, administrations should provide the following information (a copy of such information shall be sent to the Bureau):

a) ITU satellite name and publication references (IFIC number, IFIC publication date, Special Section references) for each of the non-GSO systems and GSO networks;

b) The technical information for each of the non-GSO satellite systems, as indicated in Annex 4 to this Resolution.

7 Where multiple ITU filings[1] correspond to a single operating non-GSO satellite system, the filings will be treated as a single operating non-GSO satellite system for the purposes of performing aggregate epfd calculations. The notifying administration or administrations involved shall identify the subject filings to the participants.

8 No later than four (4) months before the Consultation Meeting, administrations will submit (after having performed a conformity check on the data to be submitted) all worst-case geometry configurations (as calculated by Recommendation ITU-R S.1503) of each non-GSO system they are responsible for.

9 No later than one (1) month before the Consultation Meeting, administrations should provide (after having performed a conformity check on the data to be submitted) all participants with results, per each non-GSO system, of the single-entry epfd Probability Density Functions (PDF) and Cumulative Density Functions (CDF), together with a detail of relevant assumptions in addition to the technical information specified in Annex 4 for the purpose evaluation of 11 a). Each administration is responsible for the software used to calculate the single-entry epfd PDF and CDF.

10 After receiving the results of § 9 above and before the Consultation Meeting, the convening administration should perform a conformity check to verify the format of the single-entry input data received, in order to ensure that the convolution process can be performed properly.

11 Each Consultation Meeting should at least perform:

a) Conformity check of the input data received;

b) Execution of all convolutions;

c) Analysis of the results: indication of ‘Pass’ or ‘Fail’ for every convolution.

12 If, following the methodology developed in application of invites the ITU Radiocommunication Sector 1, all convolutions verify that the aggregate limits are met, no action is required until the next Consultation Meeting.

13 If one or more convolutions do not pass the aggregate epfd limits check, the Consultation Meeting shall apply the methodology developed in application of invites the ITU Radiocommunication Sector 2.

[1] The terms “ITU filing” indicate the CR/C and/or Notification publications relative to a non-GSO satellite system, as applicable, included in the BR International Frequency Information Circular (BR IFIC).

14 By the end of the Consultation Meeting, all aggregate epfd limits indicated in Annex 1 to this Resolution shall be met.
15 At the end of each Consultation Meeting, the convening administration should draft a report that the Bureau shall publish on the ITU website promptly.
16 After the Consultation Meeting report is available, all administrations can provide comments that the Bureau shall publish on the ITU website promptly.
ANNEX 4 TO RESOLUTION 76 (REV. WRC-23)
Information to be provided for each non-GSO satellite system
1 ITU System Name:
2 Technical parameters of the non-GSO system
2.1 Orbital parameters
TBD
2.2 Operational parameters (as required for the application of the methodology included in Recommendation ITU-R S.1503)
• Maximum number of non-GSO satellite beams transmitting/receiving at the same frequency towards the same point
• Minimum elevation
• Minimum satellite tracking duration
• TBD, based on the possible revision of Recommendation ITU-R S.1503
3 Single-entry epfd results

epfd bin	N. of occurrences	PDF	CDF
−210			100
−209.9			99.99
−209.8			…
…			

Reason: This method proposes to modify and update Resolution **76 (Rev.WRC-15)** defining the principles of consultation meetings as a method to ensure that GSO networks will be protected from NGSO aggregate interference in the Ku and the Ka bands.

MOD USA-4/7J/2

22.5K 8) Administrations operating or planning to operate non-geostationary-satellite systems in the fixed-satellite service in the frequency bands listed in Tables **22-1A** to **22-1D** of No. **22.5C** will apply the provisions of Resolution **76 (Rev.WRC-23~~15~~)** to ensure that the actual aggregate interference into geostationary fixed-satellite service and geostationary broadcasting-satellite service networks caused by such systems operating co-frequency in these frequency bands does not exceed the aggregate power levels shown in Tables **1A** to **1D** of Resolution **76 (Rev.WRC-~~15~~23)**. In the event that an administration operating a geostationary-satellite network in conformity with the Radio Regulations identifies equivalent power flux-density levels from nongeostationary-satellite systems in the fixed-satellite service which may be in excess of the aggregate limits contained in Tables **1A** to **1D** of Resolution **76 (Rev.WRC-23~~15~~)**, the administrations responsible for the non-geostationary-satellite systems in the fixed-satellite

service will apply the provisions contained in *resolves* 2 of Resolution **76 (Rev.WRC-2315)**. (WRC-1923)

Reason: Consequential

Comments of IWG-4 on NTIA/RCS Proposals to MOD No. 5.394 under WRC-23 Agenda Item 8

At its 19th meeting on March 21, 2023, IWG-4 considered the NTIA/RCS proposal to modify the U.S. country footnote in No. **5.394** of the Radio Regulations under WRC-23 Agenda Item 8 to align with national use. *See* Doc. WAC/109 and IWG-4/059, p. 6. IWG-4 reports that it was not in a position to formulate a view on this proposal for the WAC.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9.1 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)***

Background:

Resolution **774 (WRC-19)** *resolves to invite the ITU Radiocommunication Sector:*

"1 to perform a detailed review of the different systems and applications used in the amateur service and amateur-satellite service allocations in the frequency band 1 240-1 300 MHz;

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

The amateur service has a global secondary allocation in the 1 240-1 300 MHz frequency band. The amateur-satellite service has a secondary allocation in 1 260-1 270 MHz (Earth-to-space) (see No. **5.282**). Services with primary allocations in these frequency ranges include the radionavigation-satellite service (RNSS) (space-to-Earth) and (space-to-space), the radiolocation service, the earth exploration-satellite service (active), and the space research service (active).

Based on years of operational experience, many applications of the secondary amateur and amateur satellite services have successfully co-existed with all the primary services in the range 1 240-1 300 MHz. However, some cases of harmful interference caused by transmissions from stations in the amateur service operating on a secondary basis into RNSS (space-to-Earth) receivers operating on a primary basis have been observed, documented and reported in two countries.

Subsequent ITU-R studies provided an estimate of potential interference distance and confirmed that the impact of interference generally depends on the bandwidth and power of the interfering signal. Furthermore, these studies predicted that RNSS receiver protection criteria could be exceeded by co-frequency emissions from typical amateur stations.

In some cases where certain applications (in particular wide bandwidth, high duty cycle applications) could increase the potential for interference, specific spectrum management techniques and national licensing conditions have minimized any risk of harmful interference. The ITU-R is developing a Recommendation ITU-R M.[AS.GUIDANCE] providing guidelines in order to avoid such cases of harmful interference to the RNSS receivers in the future. This Recommendation could include, *inter alia*, encouragement of the use of specific sub-bands with sufficient frequency offsets from the spectrum main lobes of RNSS signals to enhance the protection of RNSS receivers in the bands under consideration.

These guidelines are intended 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.

Given the secondary allocation status of the service, there is no present need for any additional regulatory, operational or technical conditions incorporated into the Radio Regulations. The ITU-R can address and facilitate the compatibility between the secondary amateur and amateur-satellite services and co-frequency primary incumbent services through ITU Reports or Recommendations providing additional information for administrations on operational and technical matters that could be considered on a national basis.

Proposals:

NOC USA/9.1-B/1

ARTICLES

Reason: The United States is of the view that no changes to the Radio Regulations should be made under this Agenda item 9.1 topic. Administrations are encouraged to take into account ITU-R Reports/Recommendations under development on how the amateur allocation can coexist with primary services in the 1240 – 1300 MHz band.

SUP USA/9.1-B/2

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)

Reason: Consequential action

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

[Note for WAC: Provided as a revision to the CITEL PCC.II DIAP contained in GT-CMR23-2022-40-063r1.]

Source: GT/CMR-23/doc.063r1

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)****;*

DRAFT INTER-AMERICAN PROPOSALS

DIAP/1.3/1

Support: [ARG], [B], [MEX], [EQA], [URG], USA

WRC-23 agenda item 1.3 addresses the~~o~~ consideration of a possible primary allocation of the band 3600-3800 MHz to mobile service, except aeronautical mobile, in Region 1. ~~and consider possible regulatory actions in the frequency band 3600-3800 MHz in Region 1 only.~~ It should be noted that Regions 2 and 3 have a primary mobile allocation in the 3600 – 4200 MHz band. The addition of a primary mobile allocation in Region 1 would globally harmonize the 3600 – 3800 MHz band for those countries wishing to deploy mobile systems. Any changes made to the Radio Regulations under WRC-23 agenda item 1.3 must not impact the existing allocations and identifications for Region 2, nor subject Region 2 to any changed procedural or regulatory provisions. Therefore, no change is proposed for Region 2 and this proposal does not address Regions 1 and 3.

FOR AGENDA

ATTACHMENT (B)

WAC-23/107

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

Mr. Tom Sullivan
Chief, International Bureau
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Dear Mr. Sullivan:

The National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch agencies, provides the attached revised WRC-23 proposals for Agenda Item 1.17 addressing study of technical and operations issues, and regulatory provisions for satellite-to-satellite links in the bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz, and 27.5-30.0 GHz. The Radio Conference Subcommittee (RCS) also approved draft proposals for WRC-23 Agenda Item 7B addressing Non-GSO bringing into use post-milestone procedures, 7D2 addressing new RR Appendix 4 parameters for Recommendation ITU-R S.1503 updates, and 7J addressing modifications to Resolution 76 (Rev.WRC-15).

NTIA looks forward to working with FCC in reconciling these proposals for submission to CITEL PCC II as U.S. proposals. Our point of contact is Mr. Charles Glass, NTIA's WRC Coordinator, who can be reached at (202) 714-1763 or cglass@ntia.gov.

Sincerely,

Steve Molina 9 January 2023

Steve Molina
Deputy Associate Administrator

Office of Spectrum Management

Enclosures (4)

XI. UNITED STATES OF AMERICA

XII. DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.17: *to determine and carry out, on the basis of 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

Space station operations in low-Earth orbit are increasing at a rapid rate for scientific, academic, and commercial purposes. These stations vary in size from as large as the International Space Station to as small as single unit cubesats[37] and have wide ranging data requirements. Users of these systems require moving data from space to Earth, or other satellite terminal locations in an efficient, fast, and cost-effective manner.

In light of the above, satellite manufacturers are developing technologies addressing this need, including the possible use of satellite-to-satellite links with transmissions limited to the same direction of transmission (e.g., Earth-to-space direction or space-to-Earth direction) of the GSO or non-GSO FSS service providers' space station.

The ITU-R has conducted extensive sharing and compatibility studies to assess the feasibility of introducing satellite-to-satellite links in many of the frequency bands called out in Resolution **773 (WRC-19)**. Based on these studies, the United States of America proposes that use of satellite-to-satellite links be recognized in the Radio Regulations within the fixed-satellite service in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz with transmissions limited to the same direction of transmission (e.g., Earth-to-space direction or space-to-Earth direction) of the GSO or non-GSO FSS service providers' space station.

Further, non-GSO user space stations using satellite-to-satellite links shall only transmit and receive within the cone of coverage[38] of the associated GSO or non-GSO FSS service provider space stations. Non-GSO user space stations will always operate at an orbital altitude that is lower than the orbital altitude of the FSS network or system with which it is communicating. The non-GSO user is to be part of the FSS network or system providing the service and will operate in a manner that would replicate the operations of other users of the FSS network or system. Other user space stations, e.g., a space science satellite, would include FSS frequencies and be part of the FSS network or system as a non-GSO space station under a contract with the FSS network or system operator providing the service.

A proposed new WRC-23 Resolution provides satellite-to-satellite link operating conditions and regulatory provisions to ensure protection of incumbent services operations.

[37] A single unit cubesat has the dimensions of 10x10x10 centimeters and typical mass less than 2 kilograms.

[38] The cone of coverage is the conical volume of space defined by a cone whose apex is at the service provider space station and whose base does not extend beyond the edge of the notified service area of the individual service provider space station.

The United States of America further proposes no change to the Radio Regulations for the frequency band 11.7-12.7 GHz due to lack of sufficient ITU-R studies supporting satellite-to-satellite link operations in this frequency range.

Proposals

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

NOC USA/4079A17/1

11.7-13.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492	**11.7-12.1** FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488 Mobile except aeronautical mobile 5.485	**11.7-12.2** FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492
	12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488 5.485 5.489	5.487 5.487A
5.487 5.487A	**12.2-12.7** FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487A 5.488 5.490	**12.2-12.5** FIXED FIXED-SATELLITE (space-to-Earth) 5.484B MOBILE except aeronautical mobile BROADCASTING 5.487 5.484A
12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.494 5.495 5.496	**12.7-12.75** FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	**12.5-12.75** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493

Reasons: Limited ITU-R studies were done in accordance with Resolution **773 (WRC-19)** supporting only satellite-to-satellite link operations in the downlink direction in the frequency range 11.7-12.7 GHz with no corresponding uplink direction spectrum.

MOD USA/4079A17/2

15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.1-18.4	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Earth-to-space) 5.520 (space-to-space) ADD 5.A117 MOBILE 5.519 5.521	

Reasons: Include footnote in Article **5** recognizing satellite-to-satellite operations as part of the fixed-satellite service in the indicated frequency bands.

ADD USA/4079A17/3

5.A117 Space-to-space use is limited to transmissions in the space-to-Earth direction in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, and to transmissions in the Earth-to-space direction in the frequency band 27.5-30 GHz. Operations shall be in accordance with Resolution **[USA/A17/SAT-TO-SAT] (WRC-23)**. No. **4.10** does not apply.

Reasons: New footnote recognizing satellite-to-satellite operations in the fixed-satellite service with provisions for operation specified in a new WRC-23 Resolution. Such use would not fall under the safety service provisions of Article **4.10**.

MOD USA/4079A17/4

18.4-22 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.4-18.6	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Space-to-space) ADD 5.A117 MOBILE	
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive) 5.522A	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A
18.8-19.3	FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A (Space-to-space) ADD 5.A117 MOBILE	

19.3-19.7	FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523E (space-to-space) ADD 5.A117 MOBILE	
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A (space-to-space) ADD 5.A117 Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A (space-to-space) ADD 5.A117 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A (space-to-space) ADD 5.A117 Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A (space-to-space) ADD 5.A117 MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	

Reasons: Include footnote in Article **5** recognizing satellite-to-satellite operations as part of the fixed-satellite service in the indicated frequency bands.

MOD USA/4079A17/5

24.75-29.9 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
27.5-28.5	FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 (space-to-space) ADD 5.A117 MOBILE 5.538 5.540	
28.5-29.1	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 (space-to-space) ADD 5.A117 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
29.1-29.5	FIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A (space-to-space) ADD 5.A117 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	

29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 (space-to-space) ADD 5.A117 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 (space-to-space) ADD 5.A117 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 (space-to-space) ADD 5.A117 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

Reasons: Include footnote in Article **5** recognizing satellite-to-satellite operations as part of the fixed-satellite service in the indicated frequency bands.

MOD USA/4079A17/6

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.9-30	FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 **(space-to-space)** ADD 5.A117 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542	

Reasons: Include footnote in Article **5** recognizing satellite-to-satellite operations as part of the fixed-satellite service in the indicated frequency bands.

MOD USA/4079A17/7

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section V − Limits of power flux-density from space stations

TABLE **21-4** (REV.WRC-23)

Frequency band	**Service***	**Limit in dB(W/m²) for angles of arrival (δ) above the horizontal plane**				**Reference bandwidth**
		0°-5°	**5°-25°**		**25°-90°**	
13.4-13.65 GHz (Region 1)	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	**0°-25°**	**25°-80°**	**80°-84°**	**84°-90°**	4 kHz
		−159 + 0.4δ [19]	−149 [19]	−149 − 0.5(δ − 80) [19]	−151 [19]	
17.7-19.3 GHz [7, 8]	Fixed-satellite	**0°-5°**	**5°-25°**		**25°-90°**	1 MHz

	(space-to-Earth) Fixed-satellite (space-to-space) Meteorological-satellite (space-to-Earth)	−115 [14, 15] or −115 − *X* [13]	−115 + 0.5(δ − 5) [14, 15] or −115 − *X* + ((10 + *X*)/20) (δ − 5) [13]		−105 [14, 15] or −105 [13]	
17.7-19.3 GHz [7, 8]	Fixed-satellite (space-to-Earth) Fixed-satellite (space-to-space)	**0°-3°**	**3°-12°**	**12°-25°**	−105 [16]	1 MHz
		−120 [16]	−120 + (8/9) (δ − 3) [16]	−112 + (7/13) (δ − 12) [16]		
19.3-19.7 GHz	Fixed-satellite (space-to-Earth) Fixed-satellite (space-to-space)	**0°-3°**	**3°-12°**	**12°-25°**	−105 [16]	1 MHz
		−120 [16]	−120 + (8/9) (δ − 3) [16]	−112 + (7/13) (δ − 12) [16]		

TABLE **21-4** (*CONTINUED*) (REV.WRC-23)

Frequency band	**Service***	**Limit in dB(W/m²) for angles of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
19.3-19.7 GHz 21.4-22 GHz (Regions 1 and 3) 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz 27.500- 27.501 GHz	Fixed-satellite (space-to-Earth) Fixed-satellite (space-to-space) Broadcasting-satellite Earth exploration- satellite (space-to-Earth) Inter-satellite Space research (space-to-Earth)	−115 [15]	−115 + 0.5(δ − 5) [15]	−105 [15]	1 MHz
31.0-31.3 GHz 34.7-35.2 GHz (space-to-Earth transmissions referred to in No. **5.550** on the territories of countries listed in No. **5.549**)	Space research	−115	−115 + 0.5(δ − 5)	−105	1 MHz
31.8-32.3 GHz	Space research	−120 [20]	−120 + 0.75(δ − 5) [20]	−105	1 MHz
32.3-33 GHz	Inter-satellite	−135	−135 + (δ − 5)	−115	1 MHz

Reasons: Include FSS (space-to-space) in Article **21**, Table **21-4** to ensure that pfd limits to protect terrestrial services that apply to FSS (space-to-Earth) also apply to FSS (space-to-space).

MOD USA/4079A17/8

APPENDIX 4 (REV.WRC-23)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

[2] The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Space Services). (WRC-12)

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION (Rev.WRC-23)

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
A.19.b	a commitment in accordance with *resolves* 1.5 of Resolution **156** (**WRC-15**) that the administration responsible for the use of the assignment shall implement *resolves* 1.4 of Resolution **156** (**WRC-15**) Required only for geostationary-satellite networks operating in the fixed-satellite sebrvice in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz communicating with transmitting earth stations in motion				+						A.19.b	
A.20	**COMPLIANCE WITH *resolves* 1.1.4 OF RESOLUTION 169 (WRC-19)**										**A.20**	
A.20.a	a commitment that the ESIM operation would be in conformity with the Radio Regulations and Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.20.a	
A.21	**COMPLIANCE WITH *resolves* 1.2.6 OF RESOLUTION 169 (WRC-19)**										**A.21**	
A.21.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the GSO FSS network with which ESIMs communicate shall follow the procedures in *resolves* 4 of Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.21.a	
A.22	**COMPLIANCE WITH *resolves* 7 OF RESOLUTION 169 (WRC-19)**										**A.22**	
A.22.a	a commitment that aeronautical ESIMs would be in conformity with the pfd limits on the Earth's surface specified in Part II of Annex 3 to Resolution **169 (WRC-19)** Required only for the notification of earth stations in motion submitted in accordance with Resolution **169 (WRC-19)**				+						A.22.a	
A.22bis	**COMPLIANCE WITH *resolves* further 2 OF RESOLUTION [USA/A17/FSS SAT-TO-SAT] (WRC-23)**										**A.22bis**	
A.22bis.a	a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the non-GSO transmitting space station in frequency bands 27.5-30 GHz which communicate to a GSO FSS network or non-GSO FSS system shall follow the procedures in resolves further 2 of Resolution **[USA/A17/FSS SAT-TO-SAT] (WRC-23)** Required only for the notification of non-GSO space stations submitted in accordance with Resolution **[USA/A17/FSS SAT-TO-SAT] (WRC-23)**				+						A.22bis.a	
A.23	**COMPLIANCE WITH RESOLUTION 35 (WRC-19)**										**A.23**	
A.23.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.23.a	
A.24	**COMPLIANCE WITH NOTIFICATION OF A NON-GSO SHORT DURATION MISSION**										**A.24**	
A.24.a	a commitment by the administration that, in the case that unacceptable interference caused by a non-GSO satellite network or system identified as short-duration mission in accordance with Resolution **32 (WRC-19)** is not resolved, the administration shall undertake steps to eliminate the interference or reduce it to an acceptable level Required only for notification					+					A.24a	
A.25	**INCLUSION OF SPACE-TO-SPACE OPERATIONS**										**A.25**	

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*
A.25.a	an indicator showing whether space-to-space operations in accordance with Resolution [USA/A17/FSS SAT-TO-SAT] (WRC-23) with transmission in the frequency bands 27.5-30.0 GHz, or parts thereof, and reception in the frequency bands 18.1-18.6 and 18.8-20.2 GHz, or parts thereof, are included
A.25.a.1	the calculated worst-case off-axis angle between the main lobe of the space station transmitting in the frequency bands 27.5-30.0 GHz, or parts thereof, and the Earth surface
A.25.b	an indicator showing whether space-to-space operations in accordance with Resolution [USA/A17/FSS SAT-TO-SAT] (WRC-23) with transmission in the frequency bands 18.1-18.6 and 18.8-20.2 GHz, or parts thereof, and reception in the frequency bands 27.5-30.0 GHz, or parts thereof, are included
A.25.b.1	an indicator for non-GSO systems receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz showing the commitment that the equivalent power flux-density produced at any point in the geostationary-satellite orbit by emissions from all combined operations of space-to-space and typical Earth station transmissions shall not exceed the limits given in Table 22-2

Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
	X		X	X					A.25.a	
	X		X	X					A.25.a.1	
	X		X	X					A.25.b	
	X		X	X					A.25.b.1	

Reasons: Four new Appendix 4 data elements are added to provide indicators for space-to-space operations for space stations operating in accordance with Resolution [USA/A17/FSS SAT-TO-SAT] (WRC-23)

ADD USA/4079A17/9

RESOLUTION [USA/A17/FSS SAT-TO-SAT] (WRC-23)

Use of 18.1-18.6, 18.8-20.2 and 27.5-30.0 GHz frequency bands for satellite-to-satellite transmissions in the fixed-satellite service

The World Radiocommunication Conference ([tbc], 2023),

considering

a) that there is a need for non-geostationary satellite orbit (non-GSO) space stations to be able to relay collected data to the Earth, and that part of this need could be met by allowing such non-GSO space stations to communicate with fixed-satellite service (FSS) space stations operating in the geostationary satellite orbit (GSO) and in the non-GSO in the frequency bands 18.1-18.6 GHz, 18.8-20.2 and 27.5-30.0 GHz, or parts thereof;

b) that **No. 1.21** states that, in some cases, the fixed satellite service includes satellite-to-satellite links

c) that the ITU Radiocommunication Sector (ITU-R) has carried out extensive sharing and compatibility studies between incumbent services in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz, and 27.5-30 GHz and satellite-to-satellite transmissions in the fixed-satellite service;

d) that the administration responsible for the notification of non-GSO space stations communicating with GSO or non-GSO space stations in the fixed-satellite service (FSS) at higher altitude does not need to be the same administration that has already notified assignments in the FSS;

e) that imposing hard limits necessary to protect other services would provide regulatory certainty for both notifying administrations of non-GSO space station communicating with FSS space stations and potentially impacted services;

f) that the frequency bands 18.1-18.6, 18.8-20.2 GHz (space-to-Earth) and 27.5-30.0 GHz (Earth-to-space) are also allocated to terrestrial and space services used by a variety of different systems, and these existing services and their future development need to be protected, without the imposition of undue constraints, from the operation of satellite-to-satellite links,

recognizing

that any course of action taken under this Resolution has no impact on the original date of receipt of the frequency assignments of the GSO FSS satellite network or the non-GSO FSS system with which non-GSO space stations communicate or on the coordination requirements of that satellite network,

recognizing further

that in accordance with Section 6 of Rules of Procedure, associated with RR No. **11.32,** whenever a network is composed of GSO and non-GSO space stations the related assignments for communications between them shall not be considered as being subject to the coordination procedure under Section II of Article **9,**

resolves

1 that, for a non-GSO space station subject to this Resolution communicating with a GSO or non-GSO FSS space station within the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or parts thereof, the following conditions shall apply:

a) the non-GSO space station transmitting in the frequency bands 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall only operate space-to-space links when its apogee altitude[39] is lower than the minimum operational altitude[40] of the GSO or non-GSO FSS space station it communicates with and when the off-nadir angle between this GSO or non-GSO FSS space station and the non-GSO space station it communicates with is less than or equal to θ_{Max} (as defined in Annex 1 of this Resolution);

b) the GSO/non-GSO FSS space station receiving in the frequency bands 27.5-30 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall only operate space-to-space links when its minimum operational altitude is higher than the apogee altitude of the non-GSO space station with which it communicates;

c) the non-GSO space station transmitting in the frequency bands 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 and 18.8-20.2 GHz, or parts thereof, shall remain under the characteristics envelop and coordination agreements of the recorded assignments of the earth stations associated with the satellite network/system with which it communicates;

2 that non-GSO space stations subject to this Resolution receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof:

a) shall not claim protection from FSS and MSS networks and systems as well as terrestrial services operating in conformity with the Radio Regulations;

b) shall only receive characteristically the same emissions that are also being directed to earth stations from FSS space stations at higher orbital altitudes so that the interference environment can remain unchanged with respect to fixed and mobile stations, as well as to earth stations of other GSO and non-GSO FSS networks/systems from what is coordinated and notified in accordance with the Radio Regulations;

3 that GSO and non-GSO FSS space stations subject to this Resolution;

a) receiving in the frequency band 27.5-30 GHz from non-GSO space stations, shall not claim protection for satellite-to-satellite links from FSS and MSS networks and systems, as well as terrestrial services operating in conformity with the Radio Regulations;

b) shall comply with the provisions contained in Article **21** in the frequency band 18.1-18.6 GHz and 18.8-19.7 GHz to protect terrestrial services;

4 that non-GSO space stations transmitting in the frequency bands 27.5-30 GHz, or parts thereof:

a) shall not produce a power flux density at any point in the GSO arc greater than the power flux density produced by earth stations associated with the satellite network/system with which they communicate;

b) shall comply with the provisions contained in Annex 2 to this Resolution in the frequency band 27.5-29.5 GHz to protect terrestrial services;

[39] See item A.4.b.4.d of Appendix 4.

[40] See item A.4.b.4.f of Appendix 4.

c) when transmitting in the frequency band 29.1-29.5 GHz, shall limit communications to GSO FSS space stations;

d) shall not cause unacceptable interference to or otherwise impose constraints on operation or development of the non-GSO FSS service and protect non-GSO FSS space stations by complying with the provisions contained in Annex 3 to this Resolution;

5 that, with respect to Earth exploration-satellite service (EESS) (passive) operating in the frequency band 18.6-18.8 GHz, any non-GSO FSS system with an orbital apogee of less than 20,000 km transmitting in the frequency bands 18.1-18.6 GHz and 18.8-19.3 GHz when communicating with non-GSO space stations, and for which the complete notification information has been received by the Radiocommunication Bureau after 1 January 2025, shall not exceed a power flux-density produced at the surface of the oceans across the 200 MHz of the frequency band 18.6-18.8 GHz, of -118 dB(W/m²/200 MHz);

6 that, in order to accommodate satellite-to-satellite transmissions, GSO and non-GSO FSS space stations receiving in the frequency bands 27.5-30 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz, or parts thereof, shall operate in compliance with the Radio Regulations and any existing and future coordination agreements between administrations,

resolves further

1 that, subject to this Resolution:

a) the notifying administration of the GSO FSS network receiving in the frequency bands 27.5-30.0 GHz and transmitting in the frequency bands 18.1-18.6 GHz, 18.8-20.2 GHz shall indicate to the Radiocommunication Bureau (BR), that it intends to include satellite-to-satellite operations for this GSO FSS network in accordance with this Resolution, considering *resolves* 3 above;

b) the notifying administration of the non-GSO FSS system receiving in the frequency bands 27.5-29.1 GHz and 29.5-30.0 GHz and transmitting in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall indicate to the BR that it intends to include satellite-to-satellite operations for this non-GSO FSS system in accordance with this Resolution, considering *resolves* 3 above;

c) the notifying administration of the non-GSO FSS system receiving in the frequency bands 27.5-28.6 GHz and 29.5-30.0 GHz shall indicate to the BR the commitment that the equivalent power flux-density produced at any point in the geostationary-satellite orbit by emissions from all combined operations of space-to-space and typical Earth station transmissions shall not exceed the limits given in Table 22-2;

d) the notifying administration of the non-GSO space station/stations transmitting in the frequency bands 27.5-30.0 GHz towards a GSO FSS network and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall send to the BR, the relevant Appendix 4 advance publication information containing the characteristics of the non-GSO space station/stations and the associated name of the GSO FSS network with which it intends to communicate;

e) the notifying administration of the non-GSO space station/stations transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30.0 GHz towards a non-GSO FSS system at a higher orbital altitude and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall send to the BR, the relevant Appendix 4 advance publication information containing the characteristics of the non-GSO space station/stations and the associated name of the non-GSO FSS system with which it intends to communicate;

f) the notifying administration for the non-GSO transmitting space station in the frequency bands 27.5-30 GHz which communicate to a GSO FSS network or non-GSO FSS system shall send to the BR, when submitting Appendix 4 data, a commitment that, upon receiving a report of unacceptable interference, the notifying administration for the non-GSO transmitting space station which communicate to a GSO FSS network or non-GSO FSS system shall follow the procedures in *resolves further* 2;

g) the notifying administration of the GSO FSS network or non-GSO FSS system receiving in the frequency bands 27.5-30 GHz with which non-GSO transmitting space stations communicate shall follow the procedures in *resolves further* 3;

2 that in case of unacceptable interference caused by a non-GSO space station transmitting in the frequency bands 27.5-30.0 GHz:

a) the notifying administration for the non-GSO space station transmitting in the frequency bands 27.5-30.0 GHz shall cooperate with an investigation on the matter and provide, to the extent of its ability, any required information on the operation of the transmitting space station and a point of contact to provide such information;

b) the notifying administration for the non-GSO space station transmitting in the frequency bands 27.5-30.0 GHz and the notifying administration of the GSO or non-GSO FSS network or system with which the non-GSO transmitting space station communicates shall, jointly or individually, as the case may be, upon receipt of a report of unacceptable interference, take required action to eliminate or reduce interference to an acceptable level;

3 that the administration responsible for the GSO or non-GSO FSS network or system with which the non-GSO transmitting space station communicates shall ensure that:

a) for the operation of non-GSO space stations transmitting in the FSS (space-to-space) service in the frequency bands 27.5-30.0 GHz, techniques to maintain pointing accuracy with the associated FSS satellite, without inadvertently tracking adjacent GSO satellites or non-associated non-GSO satellites, are employed;

b) all necessary measures are taken so that non-GSO transmitting space stations in the frequency bands 27.5-30.0 GHz in the FSS (space-to-space) service are subject to permanent monitoring and control by a network control and monitoring centre (NCMC) or equivalent facility in order to comply with the provisions in this Resolution, and are capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands from the NCMC or equivalent facility;

c) a permanent point of contact is provided for the purpose of tracing any suspected cases of unacceptable interference from non-GSO transmitting space stations in the frequency bands 27.5-30.0 GHz in the FSS (space-to-space) service and to immediately respond to requests from the focal point;

4 that, upon receipt of the information in *resolves further* 1*a)* - 1*e)*, the BR shall examine that information with respect to the existing regulatory provisions, as well as any conditions prescribed in this Resolution, and publish the result of such examination in the International Frequency Information Circular (BR IFIC),

instructs the Director of the Radiocommunication Bureau

1 to take all necessary actions to facilitate the implementation of this Resolution, together with providing any assistance for the resolution of interference, when required;

2 to report to future world radiocommunication conferences any difficulties or inconsistencies encountered in the implementation of this Resolution;

3 that, upon examination of the information submitted by the notifying administration under *resolves further* 1*d)* or 1*e)*, if no recorded frequency assignments with typical earth stations for the relevant frequency bands can be identified for the GSO FSS network or non-GSO FSS system with which the notifying administration's non-GSO space station intends to communicate, the BR shall return the information to the notifying administration with an unfavorable finding

4 that, when assessing compliance with the pfd limits in Annex 2, to take into account atmospheric attenuation using Recommendation ITU-R P.676 and the mean global standard atmosphere from Recommendation ITU-R P.835.

ANNEX 1 TO RESOLUTION [USA/A17/FSS SAT-TO-SAT] (WRC-23)

Determination of the off-nadir angle

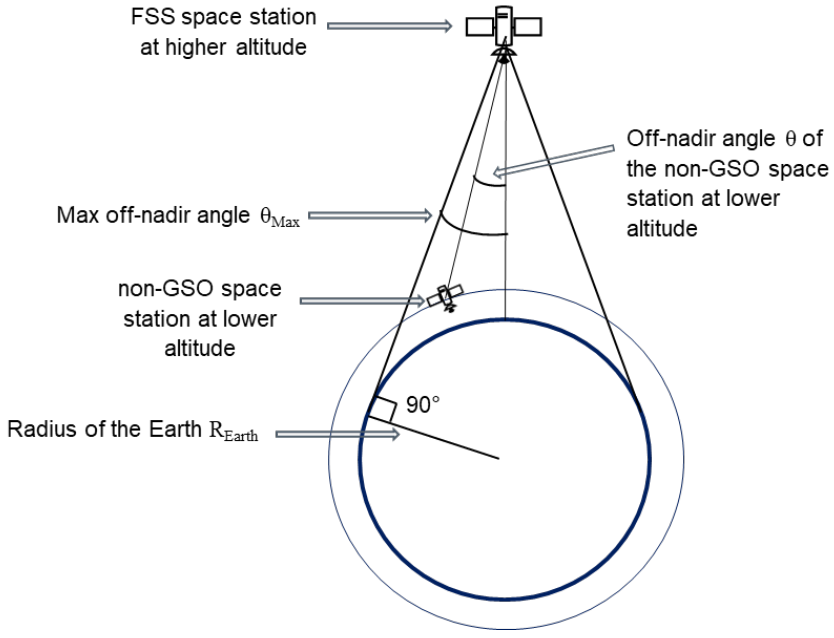
1 a non-GSO FSS space station transmitting in the frequency bands 27.5-30 GHz and receiving in the frequency bands 18.1-18.6 GHz and 18.8-20.2 GHz shall only communicate with a GSO or non-GSO FSS space station at a higher orbital altitude when the off-nadir angle between this GSO or non-GSO FSS space station and the non-GSO FSS space station it communicates with is less than or equal to:

$$\theta_{Max} = \sin^{-1}\left(\frac{R_{Earth}}{R_{Earth} + Alt_{Higher\ FSS}}\right)$$

where

R_{Earth} = 6378.145 km,

Alt_{Higher_FSS} = altitude of the GSO or non-GSO space station at higher orbital altitude in km



2 In case the notified service area of the GSO or non-GSO FSS network/system at higher orbital altitude is not global, the maximum off-nadir angle θ_{Max} will vary at each azimuth according to the notified service area and there will be a specific maximum off-nadir angle associated to each azimuth based on the position in space of the FSS network/system at higher orbital altitude and the geographic coordinates (latitude, longitude) of the border of the notified service area at each azimuth, which are extracted from the Graphical Interface Management System (GIMS) database container that was submitted to the BR when notifying a specific non-global service area.

$$\theta_{Max} = \cos^{-1}\left(\frac{\left(R_{Earth} + Alt_{FSS\_SS}\right)^2 + dist^2 - R_{Earth}^{\ 2}}{2 \times \left(R_{Earth} + Alt_{FSS\_SS}\right) \times dist}\right)$$

With

$$dist = \sqrt{(X_E - X_S)^2 + (Y_E - Y_S)^2 + (Z_E - Z_S)^2}$$

$$X_E = R_{Earth} \times \cos\left(lat_{sab}(\varphi)\right) \times \cos\left(lon_{sab}(\varphi)\right)$$
$$Y_E = R_{Earth} \times \cos\left(lat_{sab}(\varphi)\right) \times \sin\left(lon_{sab}(\varphi)\right)$$
$$Z_E = R_{Earth} \times \sin\left(lat_{sab}(\varphi)\right)$$

$$X_S = \left(R_{Earth} + Alt_{FSS\ SS}\right) \times \cos(lat_{SS}) \times \cos(lon_{SS})$$
$$Y_S = \left(R_{Earth} + Alt_{FSS_{SS}}\right) \times \cos(lat_{SS}) \times \sin(lon_{SS})$$
$$Z_S = \left(R_{Earth} + Alt_{FSS\ SS}\right) \times \sin(lat_{SS})$$

where:

$lat_{sab}(\varphi)$ = latitude of the service area border for the azimuth φ

$lon_{sab}(\varphi)$ = longitude of the service area border for the azimuth φ

lat_{SS}= latitude of the sub-satellite point of the GSO/non-GSO space station

lon_{SS}= longitude of the sub-satellite point of the GSO/non-GSO space station

ANNEX 2 TO RESOLUTION [USA/A17/FSS SAT-TO-SAT] (WRC-23)

Provisions for non-GSO space stations transmitting in the 27.5-30 GHz bands to protect terrestrial services in the frequency band 27.5-29.5 GHz

The maximum pfd produced at the surface of the Earth by emissions from a Non-GSO space station transmitting in the 27.5-30 GHz bands shall not exceed:

pfd(θ) = −115 (dB(W/(m^2 □ 1 MHz))) for 0°≤ θ ≤ 5°

pfd(θ) = −115+0.5(θ-5) (dB(W/(m^2 □ 1 MHz))) for 5°≤ θ ≤ 25°

pfd(θ) = −105 (dB(W/(m^2 □ 1 MHz))) for 25°< θ ≤ 90°

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizon).

ANNEX 3 TO RESOLUTION [USA/A17/ FSS SAT-TO-SAT] (WRC-23)

Provisions for non-GSO space stations transmitting in the 27.5-30.0 GHz bands to protect non-GSO space stations

The following conditions for non-GSO space stations transmitting in the frequency bands 27.5-30.0 GHz to protect non-GSO space stations shall apply:

a) Any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz towards a GSO FSS network shall never exceed the following on-axis e.i.r.p. spectral density limits:

1. For non-GSO space station transmit on-axis antenna gains greater than 40.6 dBi: -17.5 dBW/Hz

2. For non-GSO space station transmit on-axis antenna gains less than 40.6 dBi: -17.5 – (40.6 – on-axis gain of non-GSO space station antenna in dBi) dBW/Hz.

b) Any non-GSO space station transmitting in the frequency bands 29.5-30 GHz towards a GSO FSS network shall never exceed the following on-axis e.i.r.p. spectral density limits:

1. For non-GSO space station transmit on-axis antenna gains greater than 40.6 dBi: -16 dBW/Hz,

2. For non-GSO space station transmit on-axis antenna gains less than 40.6 dBi: -16 – (40.6 – on-axis gain of non-GSO space station antenna in dBi) dBW/Hz.

c) The total e.i.r.p. from any non-GSO space station transmitting in the frequency bands 27.5-30 GHz towards a GSO FSS network shall not exceed 66 dBW.

d) To protect fixed-satellite service feeder links to non-GSO mobile-satellite service systems the following conditions for non-GSO space stations and systems transmitting in the frequency band 29.1-29.5 GHz shall apply:

1. Emissions from any non-GSO space station communicating with a GSO network shall not exceed a maximum power spectral density of -62 dBW/Hz at the input of the antenna of the non-GSO space station,
2. Any non-GSO space station communicating with a GSO network shall have a minimum antenna diameter of 30 cm whose gain shall not exceed the gain envelope of Recommendation ITU-R S.580-6,
3. Non-GSO space stations communicating with a GSO network shall only operate in orbits with inclination between 80 and 100 degrees,
4. Non-GSO systems communicating with a GSO network shall not contain more than 100 satellites.

e) Any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz towards a non-GSO FSS system with a minimum operational altitude higher than 2000 km shall never exceed an on-axis e.i.r.p. spectral density of -20 dBW/Hz and the total e.i.r.p. shall not exceed 64 dBW.

f) Any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz towards a non-GSO FSS system with a minimum operational altitude lower than 2000 km shall never exceed an on-axis e.i.r.p. spectral density of -30 dBW/Hz and the total e.i.r.p. shall not exceed 57 dBW.

g) For off-axis angles greater than the 3.5 degrees, the off-axis e.i.r.p. emissions of any non-GSO space station transmitting in the frequency bands 27.5-29.1 GHz and 29.5-30 GHz bands to communicate with a non-GSO FSS system with a minimum operational altitude higher than 2000

km shall never exceed the envelope generated by the combination of an input power spectral density at the antenna flange of -62 dBW/Hz coupled with the off-axis gain derived from 29-25 log(□) dBi for angles between 3.5 degrees and 20 degrees.

h) *Note: a provision in the resolution, including but not limited to angular avoidance, may need to be developed to ensure that satellite-to-satellite links between non-GSO users and non-GSO service providers in the* frequency bands *27.5-28.6 and 29.5-30 GHz does not result in a loss of synchronization on gateway links of other non-GSO FSS systems. Similarly, a provision may need to be developed to ensure that satellite-to-satellite links between non-GSO users and either GSO FSS or non-GSO service providers in the* frequency band *28.6-29.1 GHz does not result in a loss of synchronization on gateway links of other non-GSO FSS systems. The level at which loss of synchronization occurs is still under consideration. In this regard, the membership is invited to provide contributions on this matter.*

{Note: provision h) is still under discussion.}

SUP USA/4079A17/10

RESOLUTION 773 (WRC-19)

Study of technical and operational issues, and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz

Reasons: Adoption by WRC-23 of the aforementioned proposals satisfies the agenda item and therefore Resolution **773 (WRC-19)** is no longer needed.

XIII.

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UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7 Topic B

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

Background:
WRC-19 approved Resolution **35 (WRC-19)**, "A milestone-based approach for the implementation of frequency assignments to space stations in a non-geostationary-satellite system in specific frequency bands and services." This Resolution contains a detailed procedure to be followed by administrations and the Radiocommunication Bureau (BR) when completing the implementation of Master International Frequency Register (MIFR) frequency assignments for non-geostationary satellite (non-GSO) systems to which the Resolution applies.
One aspect raised but not addressed in a regulatory sense in the Resolution relates to the case where a non-GSO system has completed the milestone process and subsequently experiences an intermediate- or long-term reduction of the number of satellites deployed. To provide information to the BR should this case occur, WRC-19 included *resolves* 19 in Resolution **35 (WRC-19)**, which requires the notifying administration to inform the BR "for information purposes only" of the date a reduction threshold (95% of the notified number of space stations in the system, rounded down to the lower integer, minus one) was first 'crossed'. (Reporting is not required until the number remains below the threshold for six months.) Further, if appropriate and applicable, the same *resolves* states that the notifying administration should also inform the BR of the date on which the deployment of the total number of satellites was resumed. The BR is to publish all information received under *resolves* 19 on its website.
As of 30 September 2022, the Bureau had not received, and therefore not published, any information specific to Resolution **35 (WRC-19)** *resolves* 19. Addendum 2 to the Director's Report to the 91st RRB (Document RRB22-3/5Add2) lists the twenty-one non-GSO systems to which Resolution **35 (WRC-19)** applies. Of those, four systems are fully-deployed (Milestone "M3" completed), with BIU dates of 1994, 1997, 2010, and 2018. Thus, there are only four systems to which Resolution **35 (WRC-19)** *resolves* 19 applies. Given this small sample size, it is not a surprise there have been no Resolution **35 (WRC-19)** *resolves* 19 reports. This indicates neither success nor failure of the Resolution **35 (WRC-19)** milestone procedure. It indicates that Resolution **35 (WRC-19)** has not been in force long enough to generate a sufficient quantity and quality of data to the Bureau from which to draw conclusions.
The United States finds no deficiency with Resolution **35 (WRC-19)** *resolves* 19 and no need to replace it with a post-milestone procedure. It proposes that no change is warranted at WRC-23, and believes that the information-gathering under *resolves* 19 should be allowed to continue until such time as the Director of the BR, in his or her report to a future WRC, indicates that the data show that there is a need to revisit the question of a potential post-milestone mechanism to address intermediate- and long-term reductions in the number of space stations in non-GSO systems that have completed the milestone process under Resolution **35 (WRC-19).**

Proposals:

NOC **USA-4/7B/1**

ARTICLES

NOC **USA-4/7B/2**

APPENDICES

NOC **USA-4/7B/3**

RESOLUTIONS

Reasons: The United States believes the need for a post-milestone procedure has not yet been proven necessary. No data has been provided to the Bureau under Resolution **35 (WRC-19)** *resolves* 19; there is no need to replace it with a post-milestone procedure.

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UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7 Topic D2

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;

7(D2) Topic D2 - New RR Appendix **4** parameters for Recommendation ITU-R S.1503 updates

Background: This proposal implements modification of Appendix **4** data elements to support implementation of agreed revisions to Rec. ITU-R S.1503-3. WRC-23 agenda item 7, Topic D2 is predicated on a revision to Rec. ITU-R S.1503-3 being adopted by Study Group 4 prior to WRC-23.

Proposal:

APPENDIX 4 (REV.WRC-19)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

Footnotes to Tables A, B, C and D

[2] The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Space Services). (WRC-12)

MOD USA-4/7(D2)/1

TABLE A

GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION (Rev.WRC-~~19~~23)

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14	**FOR STATIONS OPERATING IN A FREQUENCY BAND SUBJECT TO Nos. 22.5C, 22.5D, 22.5F OR 22.5L: SPECTRUM MASKS**										**A.14**	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.b.6	the mask pattern defined in terms of the power in the reference bandwidth as a function of latitude and the off-axis angle between the non-geostationary earth station boresight line and the line from the non-geostationary earth station to a point on the GSO arc or as a function of latitude, the non-geostationary earth station pointing angles (azimuth, elevation) and the difference in longitude between the non-geostationary earth station and a point on the geostationary arc					**X**					A.14.b.6	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.c.4	the type of mask, among one of the following types: (Earth-based exclusion zone angle, difference in longitude, latitude)~~, (satellite-based exclusion zone angle, difference in longitude, latitude)~~ or (satellite azimuth, satellite elevation, latitude)					**X**					A.14.c.4	
…	…	…	…	…	…	…	…	…	…	…	…	…
A.14.d.x1	the minimum angle in degrees at the surface of the Earth between the lines to any two active non-GSO satellites					±					A.14.d.x1	
A.14.d.x2	the maximum number of non-geostationary earth stations tracked co-frequency by a non-geostationary satellite					±					A.14.d.x2	
…	…	…	…	…	…	…	…	…	…	…	…	…

Reasons: Implement changes in Appendix **4** to support revision of Rec. ITU-R S.1503.

UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7 Topic J

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;
7(J) Topic J - Modifications to Resolution **76 (Rev.WRC-15)**

Background:
Resolution **76 (Rev.WRC-15)** calls for the development of Recommendations on procedures ensuring that the aggregate epfd limits are not exceeded and calls for collaboration among administrations to jointly ensure those levels are not exceeded. While the aggregate epfd limits are specified in Tables 1A to 1D of the Resolution, there is no clear methodology nor procedures outlined in Resolution **76 (Rev.WRC-15)** for the involved administrations to collaboratively determine whether these aggregate levels are exceeded.
It is recognized that whereas all administrations that operate or plan to operate non-GSO FSS should collaborate to reduce predicted aggregate emissions below the levels in Tables 1A to 1D, this is not simply a theoretical exercise whereby single-entry epfd levels from all satellite filings as verified by the Bureau would simply be aggregated, but rather the aggregate calculations must be based on realistic parameters, assumptions and modelling of interference. Similarly, any action to be taken by individual administrations to make modifications on the operations their non-GSO FSS systems must be based on real operational characteristics of those systems including those systems that would operate imminently.

The concept of "consultation process/meetings" has been established in other regulatory frameworks –specifically, in Resolutions **769 (WRC-19)** and **609 (Rev.WRC-07)** – to provide a means for administrations to evaluate aggregate interference and assure compliance with aggregate interference limits between multiple systems (non-GSO in the case of Resolution **769 (WRC-19)** and non-GSO and GSO in the case of Resolution **609 (Rev.WRC-07)**. It is noted that the frequency bands identified in Resolution **76 (Rev.WRC-15)** include challenges that are different from those included in the frequency bands identified in Resolution **769 (WRC-19)** and Resolution **609 (Rev.WRC-07)**.
This proposalmodifies and updates Resolution **76 (Rev.WRC-15)** to call specifically for further study on a consultation process for non-GSO FSS systems operating in the frequency bands specified in *considering* a) of the Resolution to ensure compliance with the aggregate epfd limits in Tables 1A to 1D of the Resolution.

Proposal:

MOD USA-4/7J/1

RESOLUTION 76 (REV.WRC-23)

Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WRC-97 adopted, in Article **22**, provisional equivalent power flux-density (epfd) limits to be met by non-geostationary fixed-satellite service (non-GSO FSS) systems in order to protect GSO FSS and GSO broadcasting-satellite service (BSS) networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 revised Article **22** to ensure the limits contained therein provide adequate protection to GSO systems without placing undue constraints on any of the systems and services sharing these frequency bands;

c) that WRC-2000 decided that a combination of single-entry validation, single-entry operational and, for certain antenna sizes, single-entry additional operational epfd limits, contained in Article **22**, along with the aggregate limits in Tables 1A to 1D as contained in Annex 1 to this Resolution, which apply to non-GSO FSS systems, protects GSO networks in these frequency bands;

d) that these single-entry validation limits have been derived from aggregate epfd masks contained in Tables 1A to 1D, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these frequency bands into GSO FSS systems should not exceed the aggregate epfd levels in Tables 1A to 1D;

f) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in the frequency bands in question are to mutually coordinate the use of frequencies in these frequency bands under the provisions of No. **9.12**;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) that, as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems will not be directly related to the actual number of systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small;

i) that the possible misapplication of single-entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to mutually share frequencies;

b) that, on account of the use of such interference mitigation techniques, it is likely that the number of non-GSO systems will remain small, as will the aggregate interference caused by non-GSO FSS systems into GSO systems;

c) that, notwithstanding *considering d)* and *e)* and *recognizing b)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Tables 1A to 1D;

d) that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Tables 1A to 1D,

noting

Recommendation ITU-R S.1588 "Methodologies for calculating aggregate downlink equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems into a geostationary fixed-satellite service network",

resolves

1 that administrations operating or planning to operate non-GSO FSS systems, for which coordination or notification information, as appropriate, was received after 21 November 1997, in the frequency bands referred to in *considering a)* above, individually or in collaboration, shall take all possible steps, including, if necessary, by means of appropriate modifications to their systems, to ensure that the aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not cause the aggregate power levels given in Tables 1A to 1D to be exceeded (see No. **22.5K**);

2 that, in the event that the aggregate interference levels in Tables 1A to 1D are exceeded, administrations operating non-GSO FSS systems in these frequency bands shall take all necessary measures expeditiously to reduce the aggregate epfd levels to those given in Tables 1A to 1D, or to higher levels where those levels are acceptable to the affected GSO administration (see No. **22.5K**),

invites the ITU Radiocommunication Sector

1 to continue its studies and to develop as a matter of urgency, a suitable methodology to calculate the aggregate epfd produced by all non-GSO FSS systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks, which may be used to determine whether the systems are in compliance with the aggregate power levels given in Tables 1A to 1D;

2 to continue its studies and to develop as a matter of urgency a Recommendation on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above, and taking into account the coordination of frequency use among non-GSO systems, in order to assist administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks, and to provide guidance to GSO network designers on the maximum epfd↓ levels expected to be produced by all non-GSO FSS systems when accurate modelling assumptions are used;

3 to develop a Recommendation containing procedures to be used among administrations in order to ensure that the aggregate epfd limits given in Tables 1A to 1D are not exceeded by operators of non-GSO FSS systems;

4 to work on the development of measurement techniques to identify the interference levels from non-GSO systems in excess of the aggregate limits given in Tables 1A to 1D, and to confirm compliance with these limits,

instructs the Director of the Radiocommunication Bureau

1 to assist in the development of the methodology referred to in *invites the ITU Radiocommunication Sector* 1 above;

2 to report to a future competent conference on the results of studies in *invites the ITU Radiocommunication Sector* 1 and 3 above.

ANNEX 1 TO RESOLUTION 76 (REV.WRC-15)

…

Reason: This method proposes to modify and update Resolution **76 (Rev.WRC-15)** to call specifically for further study on a consultation process for non-GSO FSS systems operating in the frequency bands specified in considering a) of the Resolution to use to ensure compliance with the aggregate epfd limits in Tables 1A to 1D of the Resolution.

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

Mr. Tom Sullivan
Chief, International Bureau
Federal Communications
Commission 45 L Street NE
Washington, DC 20554

Dear Mr. Sullivan:

The National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch agencies, provides the attached revised WRC-23 proposals for Agenda Item 1.11 addressing consideration of possible regulatory action to support modernization of GMDSS and the implementation of e-navigation and 7 topic C addressing protection of geostationary-satellite networks in the mobile-satellite service operating in the 7/8 GHz and 20/30 GHz bands from emissions of non-geostationary-satellite systems operating in the same frequency bands and identical directions.

NTIA looks forward to working with FCC in reconciling these proposals for submission to CITEL PCC II as U.S. proposals. Our point of contact is Mr. Charles Glass, NTIA's WRC Coordinator, who can be reached at (202) 714-1763 or cglass@ntia.gov.

Sincerely,

Steve Molina Feb 28, 2023

Steve Molina
Deputy Associate Administrator
Office of Spectrum Management

Enclosures (2)

UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.11 Issues A and B

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)**;

Background Information

This draft proposal addresses two of the three issues pertaining to WRC-23 AI 1.11 (GMDSS modernization), issue A and issue B. Issue A addresses four issues pertaining to GMDSS modernization and issue B addresses E-navigation. The third issue (issue C) has been addressed in a separate proposal.

World Radiocommunication Conference (WRC-23)
Dubai, 20 November - 15 December 2023

PLENARY MEETING

Addendum 11 to
Document 4534-E
14 December 2022
Original: English

United States of America

XIV. DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.11

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)**;

BACKGROUND INFORMATION:
This agenda item (AI) is the continuation of the AI 1.8, Issue A of WRC-19. The modernization of GMDSS, for which the work is undertaken by the IMO was not finalized at the time of WRC-19. That Conference was only able to take some preliminary decisions regarding NAVDAT in the MF and HF bands. In 2022, IMO has adopted amendments to the 1974 Safety of Life at Sea (SOLAS) Convention Chapters III and IV, together with related and consequential amendments to existing instruments other than SOLAS. These amendments will enter into force in 2024 and concluded the IMO work on modernization of the GMDSS.
This draft proposal addresses two of the three issues pertaining to WRC-23 AI 1.11 (GMDSS modernization), issue A and issue B. Issue A addresses four issues pertaining to GMDSS modernization and issue B addresses E-navigation. The third issue (issue C) has been addressed in a separate proposal.

One of the changes to the SOLAS Convention is the removal of non-406 MHz satellite EPIRBs, leaving only satellite EPIRBs operating on 406 MHz. Consequently, satellite EPIRBs operating on 1.6 GHz (1 645.5-1 646.5 MHz) and EPIRBs using VHF digital selective calling (DSC) operating at 156.525 MHz no longer form a part of the GMDSS. Given the removal of 1.6 GHz EPIRBs by the IMO, and noting that the use of the 1.6 GHz EPIRB has already ceased operation, some administrations are of the view that WRC-23 may consider possible changes to the RR related to use of the frequency band 1 645.5-1 646.5 MHz (Earth-to-space) for EPIRBs under issue A of AI 1.11. However, some other administrations are of the view that modifications to the RR in relation to this frequency range is outside the scope of this agenda item.
GMDSS Modernization
GMDSS modernization address the following four topics under issue A:

1. Current regulatory status of narrow band direct printing (NBDP) for the global maritime distress and safety system

The deletion of NBDP is proposed for distress and safety communications from GMDSS in RR Appendices **15** and **17** for MF and HF in all bands. This is due to the fact that NBDP for such purpose has been deleted by the IMO from SOLAS Chapter IV. As NBDP is not in practical use on ships for distress alerting the deletion simplifies the operational use and reduces the burden on the administrations to maintain a system which is no longer in use. Technical characteristics of NBDP in the maritime mobile service (MMS) are provided by Recommendations ITU-R M.476-5 and ITU-R M.625-4, which are incorporated by reference in the RR. In Recommendation ITU-R M.625-4 direct printing telegraphy is explicitly considered as part of the GMDSS. Further characteristics are given in Recommendation ITU-R M.627 (referenced by RR No. **51.41**).

2. An automatic connection system (ACS) for MF and HF

The implementation of an ACS is proposed for MF and HF in selected bands using DSC technology as indicated by IMO in the related performance standards, taking into account studies performed within ITU-R, especially in Recommendation ITU-R M.493 and Recommendation ITU-R M.541 and working document towards a preliminary draft new Report ITU-R M.[ACS]. It is proposed to implement this on the frequencies which had previously been used by NBDP for GMDSS in MF and all HF bands in RR Article **5** and Appendix **17** by a footnote.

Recommendations ITU-R M.493 and ITU-R M.541 have been revised in order to allow the introduction of an ACS based on DSC for communication in the MF and HF bands. Communication by MF/HF remains an integral part of the GMDSS. The implementation of ACS will ensure simple and reliable access to the required radio links for the mariner.

3. **NAVDAT**

The introduction of the NAVDAT frequencies is proposed in MF and HF bands in RR Appendix **15** and modification of the relevant provisions in RR Articles **5**, **32**, **33** and **52**.

The amendments to the 1974 SOLAS Convention chapters III and IV made it possible for NAVDAT to become an element of the modernized GMDSS. The frequencies for NAVDAT in MF and HF have been identified in RR Article **5** and Appendix **17** by the WRC-19. These frequencies need now to be inserted in RR Appendix **15.**

4. **1.6 GHz satellite emergency position indicating radio beacons**

The frequency band 1 645.5-1 646.5 MHz is allocated to the MSS (Earth-to-space) and was previously intended to be used by satellite EPIRBs ("1.6 GHz EPIRBs") operating with MSS networks. Recommendation ITU-R M.632-3, last revised in 1997, provides technical characteristics. The 1.6 GHz EPIRB service has been withdrawn from GMDSS by the IMO, and this band has remained unused for many years. The adjacent frequency band, 1 626.5-1 645.5 MHz is allocated to the MSS and is used to provide MSS service (Earth-to-space) for ships, including GMDSS SAT-COM communications (see RR No. **5.353A**).

A. E-navigation

E-navigation is a concept under study at IMO since the MSC 81 in 2005. The definition of e-navigation is given by IMO:

"E-navigation is the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance

berth to berth navigation and related services for safety and security at sea and protection of the marine environment."

As shipping moves into the digital world, e-navigation is expected to provide digital communications and digital information for the benefit of maritime safety, security and protection of the marine environment, reducing the administrative burden and increasing the efficiency of maritime trade and transport.
Among the objectives of e-navigation, quoting the strategy implementation plan of the IMO, there are the improvements of communications in general, the standardization and automation of ship's reporting and the integration and presentation of available information in graphical displays received via communication equipment.
Communication is a key element for e-navigation. Future communication systems should be digital and could include VDES and in the future NAVDAT and be developed to facilitate wide information management solutions.

PROPOSAL

This proposal address' methods to satisfy *resolves*1 and *resolves* 2 of WRC-23 agenda item 1.11 (Resolution **361 (Rev.WRC-19)).** The United States proposes to support Method A for issue A (global maritime distress and safety system modernization):

The deletion of NBDP for distress and safety communications from GMDSS in RR Appendices **15** and **17** for MF and HF in all bands. This is due to the fact that NBDP for such purpose has been deleted by the IMO from SOLAS Chapter IV. As NBDP is not in practical use on ships for distress alerting the deletion simplifies the operational use and reduces the burden on the administrations to maintain a system which is no longer in use.

– The implementation of an ACS for MF and HF in selected bands using DSC technology as indicated by IMO in the related performance standards, taking into account studies performed within ITU-R, especially in Recommendation ITU-R M.493 and Recommendation ITU-R M.541 and working document towards a preliminary draft new Report ITU-R M.[ACS]. It is proposed to implement this on the frequencies which had previously been used by NBDP for GMDSS in MF and all HF bands in RR Article **5** and Appendix **17** by a footnote.

– The 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**.

– To implement 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.

– Regarding the frequency band 1 645.5-1 646.5 MHz:

Minor modification to RR No. **5.375** are required and modify Table 15-2 of RR Appendix **15** by replacing the phrase "D&S-OPS" in column 2 with the phrase "SAT-COM." This action removes the no longer needed EPIRB limitation in the frequency band 1 645.5-1 646.5 MHz while leaving the band available for GMDSS SAT-COM communications.

B. Method B for Issue B: E-Navigation

– Previous WRCs have identified the frequency bands to be utilized for VDES and NAVDAT. These two systems can both support e-navigation.

– Satellite networks which would support e-navigation already have their allocation identified in the Radio Regulations.

– E-navigation is not part of the GMDSS.

Therefore, it is proposed a no change (**NOC**) to RR Article **5** for issue B.

MOD USA/4534A11/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD USA/4534A11/2

495-1 800 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
495-505	MARITIME MOBILE 5.82C ADD 5.A111	

Reasons: Coordination of the NAVDAT system should be done through the procedures establish by IMO, in the same way as it is done for the NAVTEX services, see Resolution **339 (Rev.WRC-07)**.

ADD USA/4534A11/3

5.A111 When establishing coast stations in the NAVDAT system on the frequencies 500 kHz and 4 226 kHz, the conditions for the use of the frequencies 500 kHz and 4 226 kHz are prescribed in Articles 31 and 52. Administrations are strongly recommended to coordinate the operating characteristics in accordance with the procedures of the International Maritime Organization (IMO) (see Resolution **[A111] (WRC-23)**). (WRC-23)

MOD USA/4534A11/4

3 230-5 003 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 063-4 438 5.131 MOD 5.132	MARITIME MOBILE 5.79A ADD 5.A111 5.109 MOD 5.110 5.130 5.128	

ADD USA/4534A11/5

3 230-5 003 kHz ADD 5.A11

MOD USA/4534A11/6

5.110 The frequencies 2 174.5 kHz, 4 177.5 kHz, 6 268 kHz, 8 376.5 kHz, 12 520 kHz and 16 695 kHz ~~are international distress frequencies for narrow-band direct-printing telegraphy. The~~

~~conditions for the use of these frequencies are prescribed in Article 31.~~ are used for automatic connection system as described in the most recent version of Recommendation ITU-R M.541. (WRC-23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. The distress frequencies for NBDP are reused for the ACS described in Recommendation ITU-R M.541 (under revision) and the new Report ITU-R M.[ACS]

MOD USA/4534A11/7

5.132 The frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz and 26 100.5 kHz are the international frequencies for the transmission of maritime safety information (MSI) (see ~~Appendix~~ Appendices 15 and **17**). (WRC-23)

Reasons: First to correct the omission of RR Appendix **15** and second to be align with RR No. **5.B111**.

5 003-7 000 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
6 200-6 525	MARITIME MOBILE 5.109 5.110 5.130 MOD 5.132 ADD 5.B111 5.137	

ADD USA/4534A11/8

ADD 5B111 The frequencies 6 337.5 kHz, 8 443 kHz, 12 663.5 kHz, 16 909.5 kHz and 22 450.5 kHz are the regional frequencies for the transmission of maritime safety information (MSI) by means of NAVDAT system (see Appendices **15** and **17**). (WRC-23)

Reasons: Introduction of the regional NAVDAT frequencies.

MOD USA/4534A11/9

7 450-13 360 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
8 195-8 815	MARITIME MOBILE 5.109 5.110 MOD 5.132 5.145 ADD 5.B111 5.111	
…/…		
12 230-13 200	MARITIME MOBILE 5.109 5.110 MOD 5.132 5.145 ADD 5.B111	

Reasons: Introduction of the regional NAVDAT frequencies.

ADD USA/4534A11/10

ADD 5.B111

Reasons: First to correct the omission of RR Appendix **15** and second to be align with RR No. **5.B111**.

MOD USA/4534A11/11

5.132

13 360-18 030 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
16 360-17 410	MARITIME MOBILE 5.109 5.110	MOD 5.132 5.145 ADD 5.B111

Reasons: Introduction of the regional NAVDAT frequencies.

ADD USA/4534A11/13

MOD USA/4534A11/14

18 030-23 350 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
22 000-22 855	MARITIME MOBILE MOD 5.132 ADD 5.B111 5.156	

Reasons: Introduction of the regional NAVDAT frequencies.

ADD USA/4534A11/13

MOD USA/4534A11/15

5.228C The use of the frequency bands 161.9625-161.9875 MHz and 162.0125-162.0375 MHz by the maritime mobile service and the mobile-satellite (Earth-to-space) service is limited to the automatic identification system (AIS), including the AIS search and rescue transmitter (AIS-SART). The use of these frequency bands by the aeronautical mobile (OR) service is limited to AIS emissions from search and rescue aircraft operations. The AIS operations in these frequency bands shall not constrain the development and use of the fixed and mobile services operating in the adjacent frequency bands. (WRC-~~12~~23)

Reasons: Recognize the use AIS frequencies for SARTs

MOD USA/4534A11/16

5.375 The use of the band 1 645.5-1 646.5 MHz by the mobile-satellite service (Earth-to-space) and for inter-satellite links is limited to distress, urgency and safety communications (see Article 31). (WRC-23)

Reasons: Introduction of the word urgency in order to reflect the last modification of SOLAS Chapter IV.

ARTICLE 19

Identification of stations

Section I − General provisions

MOD USA/4534A11/17

19.11 5) All transmissions by satellite emergency position-indicating radiobeacons (EPIRBs) operating in the band 406-406.1 MHz ~~or the band 1 645.5-1 646.5 MHz, or by EPIRBs using digital selective calling techniques,~~ shall carry identification signals. (WRC-23)

Reasons: No EPIRB operation in L band and VHF DSC.

ARTICLE 31

Frequencies for the global maritime distress and safety system (GMDSS)

Section II − Survival craft stations

MOD USA/4534A11/18

31.7 2) Equipment for transmitting locating signals from survival craft stations shall be capable of operating in the frequency band 9 200-9 500 MHz ~~band.~~or on 161.975 MHz (AIS 1 of Appendix **18**) and 162.025 MHz (AIS 2 of Appendix **18**). (WRC-23)

Reasons: The frequencies for AIS-SART homing signal need to be included.

ARTICLE 32

Operational procedures for distress communications in the global maritime distress and safety system (GMDSS) (WRC-07)

Section I − General

MOD USA/4534A11/19

32.7 § 6 The phonetic alphabet and figure code in Appendix **14** and the abbreviations and signals in accordance with the most recent version of Recommendation ITU-R M.1172 should be used where applicable[MOD1]. (WRC-03)

Reasons:

MOD USA/4534A11/20

32.7.1 The use of the Standard Marine Communication Phrases and, where language difficulties exist~~s~~, the International Code of Signals, both published by the International Maritime Organization (IMO), is also recommended. It should be noted that the pronunciations for figures in Appendix **14** and IMO SMCP are different. (WRC-23)

Reasons: In order to avoid potential confusion, it is necessary to remind the mariners and administrations of the difference in pronunciations of figures between RR Appendix **14** and IMO SMCP.

Section II − Distress alerting and distress calling (WRC-07)

MOD USA/4534A11/21

32.11 *B − Transmission of a distress alert or a distress call* (WRC-07)

Reasons:

B1 − Transmission of a distress alert or a distress call by a ship station or a ship earth station (WRC-07)

MOD USA/4534A11/22

32.12 § 8 Ship-to-shore distress alerts or calls are used to alert rescue coordination centres via coast stations or coast earth stations that a ship is in distress. These alerts are based on the use of transmissions via satellites (from a ship earth station or a satellite EPIRB) and terrestrial services (from ship stations ~~and EPIRBs~~). (WRC-~~07~~23)

Reasons: Terrestrial VHF EPRIRB is no longer in operation.

32.20 *C − Receipt and acknowledgement of distress alerts and distress calls* (WRC-07)

C1 − Procedure for acknowledgement of receipt of distress alerts or a distress call (WRC-07)

MOD USA/4534A11/23

32.21A 2) When acknowledging receipt of a distress alert sent by DSC[8], the acknowledgement in the terrestrial services shall be made by DSC~~,~~ or radiotelephony ~~or narrow-band direct-printing telegraphy as appropriate to the circumstances,~~ on the associated distress and safety frequency in the same band in which the distress alert was received, taking due account of the directions given in the most recent versions of Recommendations ITU-R M.493 and ITU-R M.541. (WRC-~~07~~23)

Reasons: NBDP has been deleted by the IMO from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, acknowledging receipt of a distress alert by NBDP should be excluded. However, acknowledge receipt by DSC or radiotelephony should be retained.

MOD USA/4534A11/24

32.23 § 15 ~~1)~~ When acknowledging by radiotelephony the receipt of a distress alert or a distress call from a ship station or a ship earth station, the acknowledgement should be given in the following form, taking into account Nos. **32.6** and **32.7**:

– the distress signal “MAYDAY”;

– the name followed by the call sign, or the MMSI or other identification of the station sending the distress message;

– the words “THIS IS”;

– the name and call sign or other identification of the station acknowledging receipt;

– the word “RECEIVED”;
– the distress signal “MAYDAY”. (WRC-12)

Reasons: Editorial changes of numbering due to the suppression of RR No. **32.24**.

SUP USA/4534A11/25
32.24

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, the acknowledging receipt of a distress alert by NBDP is not effective.

C3 − Receipt and acknowledgement by a ship station or ship earth station (WRC-07)

MOD USA/4534A11/26
32.31 2) However, in order to avoid making unnecessary or confusing transmissions in response, a ship station, which may be at a considerable distance from the incident, receiving an HF distress alert, shall not acknowledge it but shall observe the provisions of Nos. **32.36** to **32.~~38~~37**, and shall, if the distress alert is not acknowledged by a coast station within five minutes, relay the distress alert, but only to an appropriate coast station or coast earth station (see also Nos. **32.16** to **32.19H**). (WRC-~~07~~23)

Reasons: NBDP has been deleted from the GMDSS with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. If the provision of RR No. **32.38** is deleted, this provision number should be amended.

MOD USA/4534A11/27
32.34A § 21A However, unless instructed to do so by a coast station or a rescue coordination centre, a ship station may only send an acknowledgement by DSC in the event that:

a) no acknowledgement by DSC from a coast station has been observed; and

b) no other communication by radiotelephony ~~or narrow-band direct-printing telegraphy~~ to or from the vessel in distress has been observed; and

c) at least five minutes have elapsed and the distress alert by DSC has been repeated (see No. **32.21A.1**). (WRC-07)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, distress communication by NBDP is not effective.

32.36 *D − Preparations for handling of distress traffic*

32.3**8**

SUP USA/4534A11/28

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, coast stations and ship stations

need not set watch on the NBDP frequencies for GMDSS. Radio watch on the associated frequency by radiotelephony is regulated by RR No. **32.37**.

Section III − Distress traffic

32.39 *A − General and search and rescue coordinating communications*

SUP USA/4534A11/29
32.43

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, distress traffic by NBDP is not appropriate.

SUP USA/4534A11/30
32.44

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, distress traffic by NBDP is not effective.

MOD USA/4534A11/31

32.47 ~~*a)*~~ in radiotelephony, the signal SEELONCE MAYDAY, pronounced as the French expression “silence, m’aider”; (WRC-23)

Reasons: Editorial changes of numbering due to the suppression of RR No. **32.48**.

SUP USA/4534A11/32

32.48

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, distress related traffic by NBDP is not effective.

MOD USA/4534A11/33

32.52 § 32 ~~1)~~ In radiotelephony, the message referred to in No. **32.51** should consist of the following taking into account Nos. **32.6** and **32.7**:

– the distress signal “MAYDAY”;
– the words “ALL STATIONS”, spoken three times;
– the words “THIS IS”;
– the name of the station sending that message, spoken three times;
– the call sign or other identification of the station sending the message;
– the time of handing in of the message;

– the MMSI (if the initial alert has been sent by DSC), the name and the call sign of the mobile station which was in distress;

– the words "SEELONCE FEENEE" pronounced as the French words "silence fini". (WRC-12)

Reasons: Editorial changes of numbering due to the suppression of RR No. **32.53**.

SUP USA/4534A11/34
32.53

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, there is no need to announce by NBDP that the distress traffic has been finished.

MOD USA/4534A11/35

32.54 *B − On-scene communications*

Reasons:

MOD USA/4534A11/36
32.56 2) Control of on-scene communications is the responsibility of the unit coordinating search and rescue operations[10]. Simplex communications shall be used so that all on-scene mobile stations may share relevant information concerning the distress incident. ~~If direct-printing telegraphy is used, it shall be in the forward error-correcting mode.~~ (WRC-23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. On-scene communications are distress traffic between the mobile unit in distress and assisting mobile units. Therefore, on-scene communications using NBDP is not appropriate.

MOD USA/4534A11/37
32.57 § 34 1) The preferred frequencies in radiotelephony for on-scene communications are 156.8 MHz and 2 182 kHz. ~~The frequency 2 174.5 kHz may also be used for ship-to-ship on-scene communications using narrow-band direct-printing telegraphy in the forward error-correcting mode.~~ (WRC-23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, ship-to-ship on-scene communications using NBDP is not appropriate.

MOD USA/4534A11/38
32.59 § 35 The selection or designation of on-scene frequencies is the responsibility of the unit coordinating search and rescue operations[10]. Normally, once an on-scene frequency is established, a continuous aural ~~or teleprinter~~ watch is maintained by all participating on-scene mobile units on the selected frequency. (WRC-23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, ship-to-ship on-scene communications using NBDP is not appropriate.

32.60 *C − Locating and homing signals*

MOD USA/4534A11/40

32.61 § 36 1) Locating signals are radio transmissions intended to facilitate the finding of a mobile unit in distress or the location of survivors. These signals include those transmitted by searching units, and those transmitted by the mobile unit in distress, by survival craft, by ~~float-free EPIRBs, by~~ satellite EPIRBs, radar SARTs and by ~~search and rescue radar transponders~~AIS SARTs to assist the searching units. (WRC-23)

Reasons: Editorial changes to the name of EPIRB and SART. AIS-SART is also GMDSS equipment and transmit locating signal.

ARTICLE 33

Operational procedures for urgency and safety communications in the global maritime distress and safety system (GMDSS)

Section II − Urgency communications

MOD USA/4534A11/41

33.8 § 2 1) In a terrestrial system, urgency communications consist of an announcement, transmitted using digital selective calling, followed by the urgency call and message transmitted using radiotelephony~~, narrow-band direct-printing~~, or data. The announcement of the urgency message shall be made on one or more of the distress and safety calling frequencies specified in Section I of Article **31** using either digital selective calling and the urgency call format, or if not available, radio telephony procedures and the urgency signal. Announcements using digital selective calling should use the technical structure and content set forth in the most recent version of Recommendations ITU-R M.493 and ITU-R M.541. A separate announcement need not be made if the urgency message is to be transmitted through the maritime mobile-satellite service. (WRC-~~07~~23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, urgency communications by NBDP are not appropriate.

MOD USA/4534A11/42

33.12 § 6 ~~1)~~ The urgency call should consist of the following, taking into account Nos. **32.6** and **32.7**:

– the urgency signal “PAN PAN”, spoken three times;

– the name of the called station or “ALL STATIONS”, spoken three times;

– the words “THIS IS”;

– the name of the station transmitting the urgency message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial announcement has been sent by DSC),

followed by the urgency message or followed by the details of the channel to be used for the message in the case where a working channel is to be used.

In radiotelephony, on the selected working frequency, the urgency call and message consist of the following, taking into account Nos. **32.6** and **32.7**:

– the urgency signal "PAN PAN", spoken three times;
– the name of the called station or "ALL STATIONS", spoken three times;
– the words "THIS IS";
– the name of the station transmitting the urgency message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial announcement has been sent by DSC);
– the text of the urgency message. (WRC-~~12~~23)

Reasons: Editorial change to the number of provision.

SUP USA/4534A11/43
33.13

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, urgency communications by NBDP are not appropriate.

SUP USA/4534A11/44
33.17 § 9

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, urgency communications by NBDP are not appropriate.

SUP USA/4534A11/45
33.18

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, urgency communications by NBDP are not appropriate.

Section III − Medical transports

MOD USA/4534A11/46
33.20 § 11 1) For the purpose of announcing and identifying medical transports which are protected under the above-mentioned Conventions, the procedure of Section II of this Article is used. The urgency call shall be followed ~~by the addition of the single word MEDICAL in narrow-band direct-printing and~~ by the addition of the single word MAY-DEE-CAL pronounced as in French "médical", in radiotelephony. (WRC-~~07~~23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Medical advice communication belongs to GMDSS in RR Article **33**. Therefore, urgency communications for medical advice by NBDP are not appropriate.

Section IV − Safety communications

MOD USA/4534A11/47

33.31 § 15 1) In a terrestrial system, safety communications consist of a safety announcement, transmitted using digital selective calling, followed by the safety call and message transmitted using radiotelephony~~, narrow-band direct-printing~~ or data. The announcement of the safety message shall be made on one or more of the distress and safety calling frequencies specified in Section I of Article **31** using either digital selective calling techniques and the safety call format, or radiotelephony procedures and the safety signal. (WRC-~~07~~23)

Reasons: NBDP has been deleted from the GMDSS., with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, safety communications by NBDP are not appropriate.

MOD USA/4534A11/48

33.35 § 19 ~~1)~~ The complete safety call should consist of the following, taking into account Nos. **32.6** and **32.7**:

– the safety signal “SECURITE”, spoken three times;
– the name of the called station or “ALL STATIONS”, spoken three times;
– the words “THIS IS”;
– the name of the station transmitting the safety message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial announcement has been sent by DSC),

followed by the safety message or followed by the details of the channel to be used for the message in the case where a working channel is to be used.

In radiotelephony, on the selected working frequency, the safety call and message should consist of the following, taking into account Nos. **32.6** and **32.7**:

– the safety signal “SECURITE”, spoken three times;
– the name of the called station or “ALL STATIONS”, spoken three times;

– the words “THIS IS”;
– the name of the station transmitting the safety message, spoken three times;
– the call sign or any other identification;
– the MMSI (if the initial alert has been sent by DSC);
– the text of the safety message. (WRC-~~12~~23)

Reasons: Editorial changes of numbering due to the suppression of RR No. **33.36**.

SUP USA/4534A11/49
33.36

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, safety communications by NBDP are not appropriate.

SUP USA/4534A11/50
33.37

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, safety communications by NBDP are not appropriate.

SUP USA/4534A11/51
33.38

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, safety communications by NBDP are not appropriate.

Section V − Transmission of maritime safety information[2]

33.39 *A − General*
33.40 (SUP - WRC-07)

ADD USA/4534A11/52
3340*bis* **The transmission of maritime safety information using either the NAVTEX system and/or the NAVDAT system is the responsibility of the administration which shall inform the IMO in order to update the IMO Master Plan of shore-based facilities for the GMDSS (GMDSS Master Plan).** (WRC-23)

Reasons: The administrations could broadcast MSI using either the NAVTEX or NAVDAT system but shall inform the IMO in order to update the GMDSS Master Plan, this can be made by updating the GMDSS Master Plan module for the IMO GISIS (Global Integrated Ship Information System) an online system accessed via the IMO website, this is a means for mariners to know how MSI is broadcast.

33.41 § 22 The mode and format of the transmissions mentioned in Nos. **33.43**, **33.45**, **33.46**, **33.46A2** and **33.48** shall be in accordance with the relevant ITU-R Recommendations. (WRC-23)

Reasons: Reference to the new NAVDAT section in RR No. **33.46A2.**

33.42 *B − International NAVTEX system*

MOD USA/4534A11/55

33.43 § 23 Where ~~M~~maritime safety information ~~shall be~~is transmitted ~~by means of~~using the international NAVEX system, taking into account No. 33.40 *bis*, by means of narrow-band direct-printing telegraphy with forward error correction ~~using~~ the frequency 518 kHz ~~in accordance with the international NAVTEX system~~shall be used (see Appendix **15**). (WRC-23)

Reasons: Rewording of this provision taking into account RR No. **33.40*bis***.

ADD USA/4534A11/56

33.46A1 ***D − International NAVDAT system*** [TEXT MISSING]

ADD

33.46A2 § 25 Where maritime safety information is transmitted using the international NAVDAT system, taking into account No. **33.40*bis***, the frequency 500 kHz and/or 4 226 kHz shall be used (see Appendix **15**). (WRC-23)

Reasons: Introduction of a new section for the NAVDAT.

MOD USA/4534A11/57

33.47 ~~*D*~~ *E − High seas maritime safety information*

Reasons: Editorial renumbering due to the introduction of the new NAVDAT section.

MOD USA/4534A11/58

33.48 § ~~25~~26 Maritime safety information which is transmitted by means of narrow-band direct-printing telegraphy with forward error correction ~~using~~ uses the frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz and 26 100.5 kHz. Maritime safety information which is transmitted by means of the NAVDAT system uses the frequencies 6 337.5 kHz, 8 443 kHz, 12 663.5 kHz, 16 909.5 kHz and 22 450.5 kHz. (WRC-23)

Reasons: Introduction of the HF frequencies used for the NAVDAT, see RR Appendix **17** and Recommendation ITU-R M.2058.

MOD USA/4534A11/59

33.49 ~~*E*~~ *F − Maritime safety information via satellite*

Reasons: Editorial renumbering due to the introduction of the new NAVDAT section.

MOD USA/4534A11/60

33.49 *E − Maritime safety information via satellite*

Reasons:

MOD USA/4534A11/61

33.50 § ~~26~~27 Maritime safety information may be transmitted via satellite in the maritime mobile-satellite service using the frequency bands 1 530-1 545 MHz and 1 621.35-1 626.5 MHz (see Appendix **15**). (WRC-~~19~~23)

Reasons: Editorial renumbering due to the introduction of the new NAVDAT section. Paragraphs Nos. **33.51** to **33.53** to be renumbered.

ARTICLE 34

Alerting signals in the global maritime distress and safety system (GMDSS)

MOD USA/4534A11/62

Section I − ~~Emergency~~ Satellite emergency position-indicating radiobeacon (EPIRB) ~~and satellite EPIRB signals~~

Reasons: Editorial changes to the name of EPIRB.

ARTICLE 47

Operator's certificates

Section III − Conditions for the issuing of certificates

MOD USA/4534A11/63

TABLE **47-1** (WRC-23)

Requirements for radio electronic and operator's certificates

The relevant certificate is issued to a candidate who has given proof of the technical and professional knowledge and qualifications enumerated below, as indicated by an asterisk in the appropriate box	1st-class radio electronic certificate	2nd-class radio electronic certificate	General operator's certificate	Restricted operator's certificate
Knowledge of the principles of electricity and the theory of radio and of electronics sufficient to meet the requirements specified below:	*	*		

Theoretical knowledge of GMDSS radiocommuni-cation equipment, including narrow-band direct-printing telegraph and radiotelephone transmitters and receivers, digital selective calling equipment, ship earth stations, satellite emergency position-indicating radiobeacons, marine antenna systems, radio equipment for survival craft together with all auxiliary items, including power supplies, as well as general knowledge of the principles of other equipment generally used for radionavigation, with particular reference to maintaining equipment in service.	*			
General theoretical knowledge of GMDSS radiocommunication equipment, including narrow-band direct-printing telegraph and radiotelephone transmitters and receivers, digital selective calling equipment, ship earth stations, (including telegrapgy), satellite emergency position-indicating radiobeacons, marine antenna systems, radio equipment for survival craft together with all auxiliary items, including power supplies, as well as general knowledge of the principles of other equipment generally used for radionavigation, with particular reference to maintaining equipment in service.		*		
Practical knowledge of the operation and knowledge of the preventive maintenance of the equipment indicated above.	*	*		
Practical knowledge necessary for the location and repair (using appropriate testing equipment and tools) of faults in the equipment mentioned above which may occur during a voyage.	*			
Practical knowledge necessary for effecting repairs in the case of faults in the equipment indicated above, using the means available on board and, if necessary, replacing modular units.		*		

TABLE **47-1 (*END*)**

The relevant certificate is issued to a candidate who has given proof of the technical and professional knowledge and qualifications enumerated below, as indicated by an asterisk in the appropriate box	**1st-class radio electronic certificate**	**2nd-class radio electronic certificate**	**General operator's certificate**	**Restricted operator's certificate**
Detailed practical knowledge of the operation of all the GMDSS sub-systems and equipment.	*	*	*	
Practical knowledge of the operation of all the GMDSS sub-systems and equipment which is required while the ship is within the range of VHF coast stations (see NOTE 1).				*
Ability to send and to receive correctly by ~~radiotelephone~~ radiotelephony and ~~direct-printing~~ telegraphy.	*	*	*	
Ability to send and to receive correctly by radiotelephone.	*	*	*	*
Detailed knowledge of the regulations applying to radiocommunications, knowledge of the documents relating to charges for radiocommunications and knowledge of those provisions of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended which relate to radio.	*	*	*	
Knowledge of the regulations applying to radiotelephone communications and specifically of that part of those regulations relating to the safety of life.				*
Sufficient knowledge of one of the working languages of the Union. Candidates should be able to express themselves satisfactorily in that language, both orally and in writing.	*	*	*	
An elementary knowledge of one of the working languages of the Union. Candidates should be able to express themselves satisfactorily in that language, both orally and in writing. Administrations may waive the above language requirements for holders of a restricted operator's certificate when the ship station is confined to a limited area specified by the administration concerned. In such cases the certificate shall be suitably endorsed.				*

NOTE 1 − A restricted operator's certificate covers only the operation of GMDSS equipment required for GMDSS sea areas A1, and does not cover the operation of GMDSS A2/A3/A4 equipment fitted on a ship over and above the basic A1 requirements, even if the ship is in a sea area A1. GMDSS sea areas A1, A2, A3 and A4 are identified in the International Convention for the Safety of Life at Sea, (SOLAS), 1974, as amended.

NOTE 2 − (SUP - WRC-12)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Therefore, knowledge on NBDP operation is not required by GMDSS operators. Ability to send and receive correctly by radiotelephone is essential for all GMDSS operators.

ARTICLE 51

Conditions to be observed in the maritime services

Section I − Maritime mobile service

51.39 *CA − Ship stations using narrow-band direct-printing telegraphy*

MOD USA/4534A11/64

51.40 § 17 1) All ship stations using narrow-band direct-printing telegraphy equipment for general traffic ~~shall~~ should be able to send and receive on the frequency designated for ~~distress traffic by~~ narrow-band direct-printing telegraphy in the frequency bands in which they are operating. (WRC-23)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15**. Voluntary carriage of sending and receiving equipment for general traffic is still possible.

MOD USA/4534A11/65

51.41 2) The characteristics of the narrow-band direct-printing equipment ~~shall~~ should be in accordance with the most recent version of Recommendations ITU-R M.476, ~~5 and~~ ITU-R M.625 ~~4. The characteristics should also be in accordance with the most recent version of~~and Recommendation ITU-R M.627. (WRC-~~15~~23)

Reasons: NBDP has been deleted from the GMDSS. with the exception of MSI on certain frequencies which are contained in RR Appendix **15**.

51.42 CA1 − Bands between 415 kHz and 535 kHz

MOD USA/4534A11/66

51.44 *a)* send and receive class F1B or J2B emissions for general traffic on the working frequencies necessary to carry out their service; (WRC-23)

Reasons: Since NBDP is not use anymore for distress, for MSI solely the reception is needed.

51.48 CA3 − Bands between 4 000 kHz and 27 500 kHz

MOD USA/4534A11/67

51.49 § 20 All ship stations equipped with narrow-band direct-printing telegraphy apparatus for general traffic to work in the authorized bands between 4 000 kHz and 27 500 kHz

should -be able to send and receive class F1B or J2B emissions on working frequencies in each of the HF maritime mobile bands necessary to carry out their service.
All ship stations equipped with narrow-band direct-printing telegraphy apparatus for MSI reception to work in the authorized bands between 4 000 kHz and 27 500 kHz shall be able to receive class F1B or J2B emissions on working frequencies in each of the HF maritime mobile bands necessary to carry out their service. (WRC-23)

Reasons: NBDP receiving only is still required for MSI reception.

51.50 *D − Ship stations using radiotelephony*

ADD

51.64A1 *E − Ship stations receiving data transmissions* (WRC-23)

ADD USA/4534A11/68

51.64A1 *E − Ship stations receiving data transmissions* (WRC-23)

ADD USA/4534A11/69
51.64A2 ***E1 − Bands between 415 kHz and 526.5 kHz***

ADD

51.64A3 § 24*bis* All ship stations equipped with NAVDAT apparatus for receiving digital data transmissions in the authorized bands between 415 kHz and 535 kHz shall be capable of receiving class W7D emission on 500 kHz, if complying with the provisions of Chapter VII. (WRC-23)

ADD USA/4534A11/70
51.64A4 ***E2 − Bands between 4 000 kHz and 27 500 kHz***
51.64A5 § 24ter All ship stations equipped with NAVDAT apparatus for receiving digital data transmissions in the authorized bands between 4 000 kHz and 27 500 kHz shall be capable of receiving class W7D emission, if complying with the provisions of Chapter VII. (WRC-23)

Reasons: These provisions are added in order to stipulate the required class of emissions for NAVDAT in accordance with Recommendations ITU-R M.2010 and ITU-R M.2058.

ARTICLE 52

Special rules relating to the use of frequencies

Section I − General provisions

52.4 *B − Bands between 415 kHz and 535 kHz*

MOD USA/4534A11/74

52.6 § 3 1) In the maritime mobile service, no assignments shall be made on the frequency 518 kHz other than for transmission by coast stations of meteorological and navigational warnings and urgent information to ships by means of automatic narrow-band direct-printing telegraphy (International NAVTEX System). In the maritime mobile service, no assignments shall be made on the frequency 500 kHz other than for transmission by coast stations of meteorological and navigational warnings and urgent information to ships by means of the International NAVDAT System. (WRC-23)

Reasons: Protection of the frequency for the international NAVDAT system.

52.12 *D − Bands between 4 000 kHz and 27 500 kHz*

ADD USA/4534A11/75

52.13A § 6bis In the maritime mobile service, no assignments shall be made on the frequency 4 226 kHz other than for transmission by coast stations of meteorological and navigational warnings and urgent information to ships by means of International NAVDAT System. (WRC-23)

Reasons: Protection of the frequency for the international NAVDAT system.

Section III − Use of frequencies for narrow-band direct-printing telegraphy

52.96 *B − Bands between 415 kHz and 535 kHz*

MOD USA/4534A11/78

52.97 § 45 All ship stations equipped with narrow-band direct-printing apparatus for general traffic to work in the authorized bands between 415 kHz and 535 kHz ~~shall~~ should be able to send and receive class F1B emissions as specified in No. **51.44**. Additionally, ship stations complying with the provisions of Chapter **VII** shall be able to receive class F1B emissions on 518 kHz (see No. **51.45**). (WRC-23)

Reasons: NBDP receiving only is still required for NAVTEX reception.

52.102 *D − Bands between 4 000 kHz and 27 500 kHz*

MOD USA/4534A11/81

52.103 § 47 All ship stations equipped with narrow-band direct-printing telegraph apparatus for general traffic to work in the authorized bands between 4 000 kHz and 27 500 kHz ~~shall~~ should be able to send and receive class F1B emissions as specified in No. **51.49**. The assignable frequencies are indicated in ~~Appendix~~ Appendices 15 and **17**. (WRC-23)

Reasons: NBDP receiving only is still required for NAVTEX reception.

Section VII – Use of frequencies for data transmissions (WRC-12)

52.261 *A – General* (WRC-12)

52.262 Frequencies assigned to coast stations for data transmissions shall be indicated in the List of Coast Stations and Special Service Stations (List IV). This List shall also indicate any other useful information concerning the service performed by each coast station. (WRC-12)

ADD USA/4534A11/84

52.262A1 *B − Bands between 415 kHz and 526.5 kHz* (WRC-23)

ADD

B1 − Mode of operation of stations **(WRC-23)**

ADD USA/4534A11/85

52.262A2 The class of emissions to be used for data transmissions in the bands between 415 kHz and 526.5 kHz should be in accordance with the most recent version of Recommendation ITU-R M.2010. Coast stations as well as ship stations should use radio systems specified in the most recent version of Recommendation ITU-R M.2010. (WRC-23)

Reasons: The frequency usages for MF NAVDAT system need to be included.

ADD USA/4534A11/86

52.263 ~~B~~C – Bands between 4 000 kHz and 27 500 kHz (WRC-~~12~~23)

Reasons:

MOD USA/4534A11/87

~~B1~~ C1 – Mode of operation of stations (WRC-~~12~~23)

Reasons:

MOD USA/4534A11/88

52.264 The class of emissions to be used for data transmissions in ~~this section~~the bands between 4 000 kHz and 27 500 kHz should be in accordance with the most recent version of Recommendation ITU-R M.1798 or the most recent version of Recommendation ITU-R M.2058. Coast stations as well as ship stations should use radio systems specified in the most recent version of Recommendation ITU-R M.1798 or the most recent version of Recommendation ITU-R M.2058. (WRC-~~15~~23)

Reasons: The frequency usages for HF NAVDAT system need to be included.

52.265 Coast stations employing the class of emissions in accordance with No. **52.264** in the frequency bands between 4 000 kHz and 27 500 kHz shall not exceed a peak envelope power of 10 kW. (WRC-12)

ADD USA/4534A11/89

52.265A1 Coast stations employing the class of emissions in accordance with the most recent version of Recommendation ITU R M.2058 in the frequency bands between 4 000 kHz and 27 500 kHz shall not exceed a mean power in the following values.

Band	*Maximum mean power*
4 MHz	5 kW
6 MHz	5 kW
8 MHz	10 kW
12 MHz	10 kW
16 MHz	10 kW
18/19 MHz	10 kW
22 MHz	10 kW

(WRC-23)

Reasons: Introduction of the maximum mean power for the NAVDAT system by the coast station in the HF bands.

MOD USA/4534A11/92

APPENDIX 14 (REV.WRC-~~07~~23)

Phonetic alphabet and figure code

(See Articles ~~30~~ 32 and 57) (WRC-~~07~~23)

Reasons: This is an editorial mistake. Articles referring to RR Appendix **14** are RR Articles **32** (**32.7**) and **57** (**57.7**) instead of RR Articles **30** and **57**.

APPENDIX 15 (REV.WRC-19)

Frequencies for distress and safety communications for the Global Maritime Distress and Safety System

MOD USA/4534A11/93

TABLE 15-1 (WRC-~~07~~23)

Frequencies below 30 MHz

Frequency (kHz)	Description of usage	Notes
490	MSI	The frequency 490 kHz is used exclusively for maritime safety information (MSI). (WRC-03)
500	MSI	The frequency 500 kHz is used exclusively by the international NAVDAT system (see Resolution [**A111**] **(WRC-23)**).
518	MSI	The frequency 518 kHz is used exclusively by the international NAVTEX system.
~~*2 174.5~~	~~NBDP COM~~	

*2 182	RTP-COM	The frequency 2 182 kHz uses class of emission J3E. See also No. **52.190**.
*2 187.5	DSC	
3 023	AERO-SAR	The aeronautical carrier (reference) frequencies 3 023 kHz and 5 680 kHz may be used for intercommunication between mobile stations engaged in coordinated search and rescue operations, and for communication between these stations and participating land stations, in accordance with the provisions of Appendix **27** (see Nos. **5.111** and **5.115**).
*4 125	RTP-COM	See also No. **52.221**. The carrier frequency 4 125 kHz may be used by aircraft stations to communicate with stations of the maritime mobile service for distress and safety purposes, including search and rescue (see No. **30.11**).
~~*4 177.5~~	~~NBDP-COM~~	
*4 207.5	DSC	
4 209.5	MSI	The frequency 4 209.5 kHz is exclusively used for NAVTEX-type transmissions (see Resolution **339 (Rev.WRC-07)**).
4 210	MSI-HF	
4 226	MSI	The frequency 4 226 kHz is exclusively used for the international NAVDAT system (see Resolution [**A111] (WRC-23)**).
5 680	AERO-SAR	See note under 3 023 kHz above.
*6 215	RTP-COM	See also No. **52.221**.
~~*6 268~~	~~NBDP-COM~~	
*6 312	DSC	

TABLE 15-1 (*END*) (WRC-07)

Frequency (kHz)	Description of usage	Notes
6 314	MSI-HF	By means of narrow-band direct-printing telegraphy.
6 337.5	MSI-HF	By means of the NAVDAT system.
*8 291	RTP-COM	
~~*8 376.5~~	~~NBDP COM~~	
*8 414.5	DSC	
8 416.5	MSI-HF	By means of narrow-band direct-printing telegraphy.
8 443	MSI-HF	By means of the NAVDAT system.
*12 290	RTP-COM	
~~*12 520~~	~~NBDP COM~~	
*12 577	DSC	
12 579	MSI-HF	By means of narrow-band direct-printing telegraphy.
*16 420	RTP-COM	
~~*16 695~~	~~NBDP COM~~	
*16 804.5	DSC	
16 806.5	MSI-HF	By means of narrow-band direct-printing telegraphy.
16 909.5	MSI-HF	By means of the NAVDAT system.
19 680.5	MSI-HF	By means of narrow-band direct-printing telegraphy.
22 376	MSI-HF	By means of narrow-band direct-printing telegraphy.
22 450.5	MSI-HF	By means of the NAVDAT system.
26 100.5	MSI-HF	By means of narrow-band direct-printing telegraphy.

Legend:

AERO-SAR These aeronautical carrier (reference) frequencies may be used for distress and safety purposes by mobile stations engaged in coordinated search and rescue operations.

DSC These frequencies are used exclusively for distress and safety calls using digital selective calling in accordance with No. **32.5** (see Nos. **33.8** and **33.32**). (WRC-07)

MSI In the maritime mobile service, these frequencies are used exclusively for the transmission of maritime safety information (MSI) (including meteorological and navigational warnings and urgent information) by coast stations to ships, by means of narrow-band direct-printing telegraphy.

MSI-HF In the maritime mobile service, these frequencies are used exclusively for the transmission of high seas MSI by coast stations to ships, by means of narrow-band direct-printing telegraphy or the NAVDAT system. (WRC-23)

~~**NBDP COM** These frequencies are used exclusively for distress and safety communications (traffic) using narrow-band direct-printing telegraphy.~~

RTP-COM These carrier frequencies are used for distress and safety communications (traffic) by radiotelephony.

* Except as provided in these Regulations, any emission capable of causing harmful interference to distress, alarm, urgency or safety communications on the frequencies denoted by an asterisk (*) is prohibited. Any emission causing harmful interference to distress and safety communications on any of the discrete frequencies identified in this Appendix is prohibited. (WRC-07)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15** and NAVDAT has been introduced in the GMDSS.

MOD USA/4534A11/94

TABLE 15-2 (WRC-~~19~~23)

Frequencies above 30 MHz (VHF/UHF)

Frequency (MHz)	Description of usage	Notes
…		
*1 645.5-1 646.5	~~D&S OPS~~SAT-COM	Use of the band 1 645.5-1 646.5 MHz (Earth-to-space) is limited to distress, urgency and safety operations (see No. **5.375**). (WRC-23)
…		

Reasons: The frequency band had been assigned limited to the distress alerting by EPIRB (Inmarsat E). As this service has been ceased, this frequency band should be used limited to distress, urgency and safety communication.

APPENDIX 17 (REV.WRC-19)

Frequencies and channelling arrangements in the high-frequency bands for the maritime mobile service

MOD USA/4534A11/95

PART A – Table of subdivided bands (WRC-~~19~~23)

In the Table, where appropriate[1], the assignable frequencies in a given band for each usage are:

– indicated by the lowest and highest frequency, in heavy type, assigned in that band;

– regularly spaced, the number of assignable frequencies (*f.*) and the spacing in kHz being indicated in italics.

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service

Band (MHz)	4	6	8	12	16	18/19	22	25/26
Limits (kHz)	4 063	6 200	8 195	12 230	16 360	18 780	22 000	25 070

[1] Within the non-shaded boxes.

Frequencies assignable to ship stations for oceanographic data transmission *c)*	**4 063.3** to **4 064.8** *6 f.* *0.3 kHz*							
Limits (kHz)	4 065	6 200	8 195	12 230	16 360	18 780	22 000	25 070
Frequencies assignable to ship stations for telephony, duplex operation *a) i) t)*	**4 066.4** to **4 144.4** *27 f.* *3 kHz*	**6 201.4** to **6 222.4** *8 f.* *3 kHz*	**8 196.4** to **8 292.4** *33 f.* *3 kHz*	**12 231.4** to **12 351.4** *41 f.* *3 kHz*	**16 361.4** to **16 526.4** *56 f.* *3 kHz*	**18 781.4** to **18 823.4** *15 f.* *3 kHz*	**22 001.4** to **22 157.4** *53 f.* *3 kHz*	**25 071.4** to **25 098.4** *10 f.* *3 kHz*
Limits (kHz)	4 146	6 224	8 294	12 353	16 528	18 825	22 159	25 100

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service (*continued*)

Band (MHz)	4	6	8	12	16	18/19	22	25/26
Limits (kHz)	4 146	6 224	8 294	12 353	16 528	18 825	22 159	25 100
Frequencies assignable to ship stations as well as coast stations for telephony, simplex operation *a) u) v)*	**4 147.4** to **4 150.4** *2 f.* *3 kHz*	**6 225.4** to **6 231.4** *3 f.* *3 kHz*	**8 295.4** to **8 298.4** *2 f.* *3 kHz*	**12 354.4** to **12 366.4** *5 f.* *3 kHz*	**16 529.4** to **16 547.4** *7 f.* *3 kHz*	**18 826.4** to **18 844.4** *7 f.* *3 kHz*	**22 160.4** to **22 178.4** *7 f.* *3 kHz*	**25 101.4** to **25 119.4** *7 f.* *3 kHz*
Limits (kHz)	4 152	6 233	8 300	12 368	16 549	18 846	22 180	25 121
Frequencies assignable to ship stations for data transmission *e) m) p) q) r) u)*	**4 153.5** to **4 168.5** *6 f.* *3 kHz*	**6 234.5** to **6 258.5** *9 f.* *3 kHz*	**8 301.5** to **8 337.5** *13 f.* *3 kHz*	**12 369.5** to **12 417.5** *17 f.* *3 kHz*	**16 550.5** to **16 613.5** *22 f.* *3 kHz*	**18 847.5** to **18 871.5** *9 f.* *3 kHz*	**22 181.5** to **22 238.5** *20 f.* *3 kHz*	**25 122.5** to **25 176.5** *19 f.* *3 kHz*
Limits (kHz)	4 170	6 260	8 339	12 419	16 615	18 873	22 240	25 178
Frequencies assignable to ship as well as coast stations for data transmission *e) m) p) q) u)*								**25 179.5** to **25 206.5** *10 f.* *3 kHz*
Limits (kHz)	4 170	6 260	8 339	12 419	16 615	18 873	22 240	25 208.25
Frequencies (paired and non-paired) assignable to ship stations for narrow-band direct-printing (NBDP) telegraphy and data transmission systems at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *b) d)*		**6 260.25** to **6 260.75** *2 f.* *0.5 kHz*	**8 339.25** to **8 339.75** *2 f.* *0.5 kHz*	**12 419.25** to **12 419.75** *2 f.* *0.5 kHz*	**16 615.25** to **16 616.75** *4 f.* *0.5 kHz*	**18 873.5** to **18 880** *14 f.* *0.5 kHz*		
Limits (kHz)	4 170	6 261	8 340	12 420	16 617	18 880.25	22 240	25 208.25
Frequencies assignable to ship stations for oceanographic data transmission *c)*		**6 261.3** to **6 262.5** *5 f.* *0.3 kHz*	**8 340.3** to **8 341.5** *5 f.* *0.3 kHz*	**12 420.3** to **12 421.5** *5 f.* *0.3 kHz*	**16 617.3** to **16 618.5** *5 f.* *0.3 kHz*		**22 240.3** to **22 241.5** *5 f.* *0.3 kHz*	
Limits (kHz)	4 170	6 262.75	8 341.75	12 421.75	16 618.75	18 880.25	22 241.75	25 208.25

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service (*continued*)

Band (MHz)	4	6	8	12	16	18/19	22	25/26
Limits (kHz)	4 170	6 262.75	8 341.75	12 421.75	16 618.75	18 880.25	22 241.75	25 208.25
Frequencies (paired and non-paired) assignable to ship stations for narrow-band direct-printing (NBDP) telegraphy and data transmission systems at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *b) d) j)*	**4 170.5** to **4 180** *20 f.* *0.5 kHz*	**6 263** to **6 269.5** *14 f.* *0.5 kHz*		**12 422** *1 f.* *0.5 kHz*				
Limits (kHz)	4 180.25	6 269.75	8 341.75	12 422.25	16 618.75	18 880.25	22 241.75	25 208.25
Frequencies assignable to ship stations for data transmission *e) m) p) q) u)*	**4 181.75** to **4 187.75** *3f.* *3 kHz*	**6 271.25** to **6 277.25** *3 f.* *3 kHz*	**8 343.25** to **8 358.25** *6 f.* *3 kHz*	**12 423.75** to **12 450.75** *10 f.* *3 kHz*	**16 620.25** to **16 680.25** *21 f.* *3 kHz*	**18 881.75** to **18 893.75** *5 f.* *3 kHz*	**22 243.25** to **22 288.25** *16 f.* *3 kHz*	
Limits (kHz)	4 189.25	6 278.75	8 359.75	12 452.25	16 681.75	18 895.25	22 289.75	25 208.25
Frequencies assignable to ship as well as coast stations for data transmission *e) m) p) q) u)*	**4 190.75** to **4 196.75** *3f.* *3 kHz*	**6 280.25** to **6 310.25** *11 f.* *3 kHz*	**8 361.25** to **8 373.25** *5 f.* *3 kHz*	**12 453.75** to **12 474.75** *8 f.* *3 kHz*		**18 896.75** *1 f.* *3 kHz*		
Limits (kHz)	4 198.25	6 311.75	8 374.75	12 476.25	16 681.75	18 898.25	22 289.75	25 208.25
Frequencies assignable to coast stations for data transmission *e) m) p) q) u)*	**4 199.75** to **4 205.75** *3f.* *3 kHz*							
Limits (kHz)	4 207.25	6 311.75	8 374.75	12 476.25	16 681.75	18 898.25	22 289.75	25 208.25
Frequencies (paired and non-paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK *b) d) j)*			**8 375** to **8 383.5** *18 f.* *0.5 kHz*	**12 476.5** to **12 522.5** *93 f.* *0.5 kHz*	**16 682** to **16 698.5** *34 f.* *0.5 kHz*		**22 290** to **22 299** *19 f* *0.5 kHz*	
Limits (kHz)	4 207.25	6 311.75	8 383.75	12 522.75	16 698.75	18 898.25	22 299.25	25 208.25

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service (*continued*)

Band (MHz)	4	6	8	12	16	18/19	22	25/26
Limits (kHz)	4 207.25	6 311.75	8 383.75	12 522.75	16 698.75	18 898.25	22 299.25	25 208.25
Frequencies assignable to ship as well as coast stations for data transmission *e) p) q) u)*			**8 385.5** to **8 406.5** *8 f.* *3 kHz*	**12 524.25** to **12 575.25** *18 f.* *3 kHz*	**16 700.5** to **16 802.5** *35 f.* *3 kHz*		**22 300.75** to **22 372.75** *25 f.* *3 kHz*	
Limits (kHz)	4 207.25	6 311.75	8 408	12 576.75	16 804	18 898.25	22 374.25	25 208.25
Frequencies assignable to coast stations for data transmission *e) m) p) q) u)*			**8 409.5** to **8 412.5** *2 f.* *3 kHz*					
Limits (kHz)	4 207.25	6 311.75	8 414	12 576.75	16 804	18 898.25	22 374.25	25 208.25
Frequencies assignable to ship stations for digital selective calling *k) l)*	**4 207.5** to **4 209** 4 f. 0.5 kHz	**6 312** to **6 313.5** 4 f. 0.5 kHz	**8 414.5** to **8 416** 4 f. 0.5 kHz	**12 577** to **12 578.5** 4 f. 0.5 kHz	**16 804.5** to **16 806** 4 f. 0.5 kHz	**18 898.5** to **18 899.5** 3 f. 0.5 kHz	**22 374.5** to **22 375.5** 3 f. 0.5 kHz	**25 208.5** to **25 209.5** 3 f. 0.5 kHz
Limits (kHz)	4 209.25	6 313.75	8 416.25	12 578.75	16 806.25	18 899.75	22 375.75	25 210
Limits (kHz)	4 209.25	6 313.75	8 416.25	12 578.75	16 806.25	19 680.25	22 375.75	26 100.25
Frequencies (paired and non-paired) assignable to coast stations for NBDP and data transmission systems, at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *b) d) n) o)*	**4 209.5** to **4 216** 14 f. 0.5 kHz	**6 314** to **6 321.5** 16 f. 0.5 kHz	**8 416.5** to **8 423.5** 15 f. 0.5 kHz	**12 579** to **12 624.5** 92 f. 0.5 kHz	**16 806.5** to **16 821.5** 31 f. 0.5 kHz	**19 680.5** 1 f. 0.5 kHz	**22 376** 1 f. 0.5 kHz	**26 100.5** to **26 102.5** 5 f. 0.5 kHz
Limits (kHz)	4 216.25	6 321.75	8 423.75	12 624.75	16 821.75	19 680.75	22 376.25	26 102.75
Frequencies assignable to ship stations for data transmission *e) m) p) q) u)*							**22 377.75** to **22 380.75** 2 f. 3 kHz	
Limits (kHz)	4 216.25	6 321.75	8 423.75	12 624.75	16 821.75	19 680.75	22 382.25	26 102.75
Frequencies assignable to ship as well as coast stations for data transmission *e) m) p) q) u)*	**4 217.75** 1 f. 3 kHz				**16 823.25** to **16 838.25** 6 f. 3 kHz			

Limits (kHz)	4 219.25	6 321.75	8 423.75	12 624.75	16 839.75	19 680.75	22 382.25	26 102.75

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service (*continued*)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 219.25	6 321.75	8 423.75	12 624.75	16 839.75	19 680.75	22 382.25	26 102.75
Frequencies assignable to coast stations for data transmission *e) m) q) u)*		**6 323.25** to **6329.25** *3 f. 3 kHz*	**8 425.5** to **8 434.5** *4 f. 3 kHz*	**12 626.25** to **12 653.25** *10 f. 3 kHz*	**16 841.25** to **16 901.25** *21 f. 3 kHz*	**19 682.25** *1 f. 3 kHz*		**26 104.25** to **26 119.25** *6 f. 3 kHz*
Limits (kHz)	4 219.25	6 330.75	8 436.25	12 654.75	16 902.75	19 683.75	22 382.25	26 120.75
Frequencies (paired and non-paired) assignable to coast stations for NBDP and data transmission systems, at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *b) d)*				**12 655** to **12 656.5** *4 f. 0.5 kHz*		**19 684** to **19 691** *15 f. 0.5 kHz*	**22 382.5** to **22 389** *14 f. 0.5 kHz*	
Limits (kHz)	4 219.25	6 330.75	8 436.25	12 656.75	16 902.75	19 691.25	22 389.25	26 120.75
Frequencies assignable to coast stations for data transmission *e) m) p) q) u)*						**19 692.75** to **19 701.75** *4 f. 3 kHz*	**22 390.75** to **22 441.75** *18 f. 3 kHz*	
Limits (kHz)	4 219.25	6 330.75	8 436.25	12 656.75	16 902.75	19 703.25	22 443.25	26 120.75
Frequencies (non-paired) assignable to coast stations for NBDP and data transmission systems, at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *b)*							**22 443.5** *1 f. 0.5 kHz*	
Limits (kHz)	4 219.25	6 330.75	8 436.25	12 656.75	16 902.75	19 703.25	22 443.75	26 120.75
Frequencies assignable to coast stations for digital selective calling *l)*	**4 219.5** to **4 220.5** *3 f. 0.5 kHz*	**6 331** to **6 332** *3 f. 0.5 kHz*	**8 436.5** to **8 437.5** *3 f. 0.5 kHz*	**12 657** to **12 658** *3 f. 0.5 kHz*	**16 903** to **16 904** *3 f. 0.5 kHz*	**19 703.5** to **19 704.5** *3 f. 0.5 kHz*	**22 444** to **22 445** *3 f. 0.5 kHz*	**26 121** to **26 122** *3 f. 0.5 kHz*
Limits (kHz)	4 221	6 332.5	8 438	12 658.5	16 904.5	19 705	22 445.5	26 122.5

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service (*end*)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 221	6 332.5	8 438	12 658.5	16 904.5	19 705	22 445.5	26 122.5
Frequencies assignable for wide-band systems, facsimile, special and data transmission systems and direct-printing telegraphy systems *m) p) s) pp) ppp)*								
Limits (kHz)	4 351	6 501	8 707	13 077	17 242	19 755	22 696	26 145
Frequencies assignable to coast stations for telephony, duplex operation *a) t)*	**4 352.4** to **4 436.4** *29 f. 3 kHz*	**6 502.4** to **6 523.4** *8 f. 3 kHz*	**8 708.4** to **8 813.4** *36 f. 3 kHz*	**13 078.4** to **13 198.4** *41 f. 3 kHz*	**17 243.4** to **17 408.4** *56 f. 3 kHz*	**19 756.4** to **19 798.4** *15 f. 3 kHz*	**22 697.4** to **22 853.4** *53 f. 3 kHz*	**26 146.4** to **26 173.4** *10 f. 3 kHz*
Limits (kHz)	4 438	6 525	8 815	13 200	17 410	19 800	22 855	26 175

a) See Part B, Section I.

b) See Part B, Section III.

c) The frequency bands may also be used by buoy stations for oceanographic data transmission and by stations interrogating these buoys.

d) See Part B, Section II.

e) See Part B, Section IV.

i) For the use of the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz and 16 420 kHz in these sub-bands by ship and coast stations for distress and safety purposes, by single-sideband radiotelephony, see Article 31.

j) For the use of the assigned frequencies 4 177.5 kHz, 6 268 kHz, 8 376.5 kHz, 12 520 kHz and 16 695 kHz in these sub-bands by ship and coast stations for ~~distress~~ the automatic connection system (ACS)~~and safety purposes, by NBDP telegraphy, see Article 31~~. (WRC-23)

k) For the use of the assigned frequencies 4 207.5 kHz, 6 312 kHz, 8 414.5 kHz, 12 577 kHz and 16 804.5 kHz in these sub-bands by ship and coast stations for distress and safety purposes, by digital selective calling, see Article 31.

l) The following paired assigned frequencies (for ship/coast stations) 4 208/4 219.5 kHz, 6 312.5/6 331 kHz, 8 415/8 436.5 kHz, 12 577.5/12 657 kHz, 16 805/16 903 kHz, 18 898.5/19 703.5 kHz, 22 374.5/22 444 kHz and 25 208.5/26 121 kHz are the first choice international frequencies for digital selective calling (see Article 54).

m) Frequencies from these frequency bands may also be used for A1A or A1B Morse telegraphy subject to not claiming protection from other stations in the maritime mobile service using digitally modulated emissions. Any frequencies so assigned shall be multiples of 100 Hz. Administrations shall ensure a uniform distribution of such assignments within the bands.

n) The assigned frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz and 26 100.5 kHz are the exclusive international frequencies for the transmission of maritime safety information (MSI) (see Articles 31 and 33).

o) The frequency 4 209.5 kHz is an exclusive international frequency for the transmission of NAVTEX type information (see Articles 31 and 33).

p) These sub-bands, except the frequencies referred to in Notes *i), j)*, *n)* and *o)*, are designated for digitally modulated emissions in the maritime mobile service (e.g. as described in the most recent version of Recommendation ITU-R M.1798). The provisions of No. **15.8** apply. (WRC-15)

pp) The frequency bands 4 221-4 231 kHz, 6 332.5-6 342.5 kHz, 8 438-8 448 kHz, 12 658.5-12 668.5 kHz, 16 904.5-16 914.5 kHz and 22 445.5-22 455.5 kHz may also be used by the NAVDAT system, on condition that the use of NAVDAT system transmitting stations is limited to coast stations operating in accordance with the most recent version of Recommendation ITU-R M.2058. (WRC-19)

ppp) The frequency 4 226 kHz is an exclusive frequency for the International NAVDAT system (see Articles **33** and **52**). (WRC-23)

q) These frequency bands may be used by narrow-band direct-printing applications by administrations, subject to not claiming protection from other stations in the maritime mobile service using digitally modulated emissions.

r) Frequencies in these bands may be used for wide-band telegraphy, facsimile and special data transmission on the condition that interference is not caused to and protection is not claimed from stations in the maritime mobile service using digitally modulated emissions.

s) The frequency bands 4 345-4 351 kHz, 6 495-6 501 kHz, 8 701-8 707 kHz may be used for simplex (single-sideband) telephone operation (regularly spaced by 3 kHz), in accordance with provision No. **52.177**, subject to not claiming protection from other stations in the maritime mobile service using digitally modulated emissions.

t) The frequency bands 4 065-4 146 kHz, 4 351-4 438 kHz, 6 200-6 224 kHz, 6 501-6 525 kHz, 8 195-8 294 kHz, 8 707-8 815 kHz, 12 230-12 353 kHz, 13 077-13 200 kHz, 16 360-16 528 kHz, 17 242-17 410 kHz, 18 780-18 825 kHz, 19 755-19 800 kHz, 22 000-22 159 kHz, 22 696-22 855 kHz, 25 070-25 100 kHz and 26 145-26 175 kHz may be used, in accordance with the Appendix **25** allotment Plan, for digitally modulated emissions as described in the most recent version of Recommendation ITU-R M.1798 on the condition that it shall not cause harmful interference to, or claim protection from other stations in the maritime mobile service using radiotelephony operations. The digitally modulated emissions may be used provided that their occupied bandwidth does not exceed 2 800 Hz, it is situated wholly within one frequency channel and the peak envelope power of coast stations does not exceed 10 kW and the peak envelope power of ship stations does not exceed 1.5 kW per channel. (WRC-15)

u) These frequency bands may be used for wide-band digitally modulated emissions by combining multiple 3 kHz contiguous channels.

v) The frequency bands 4 146-4 152 kHz, 6 224-6 233 kHz, 8 294-8 300 kHz, 12 353-12 368 kHz, 16 528-16 549 kHz, 18 825-18 846 kHz, 22 159-22 180 and 25 100-25 121 kHz may be used for simplex digitally modulated emissions as described in the most recent version of Recommendation ITU-R M.1798 on condition that it shall not cause harmful interference to, or claim protection from other stations in the maritime mobile service using radiotelephony operations. The digitally modulated emissions may be used provided that their occupied bandwidth does not exceed 2 800 Hz, it is situated wholly within one frequency channel and the peak envelope power of coast stations does not exceed 10 kW and the peak envelope power of ship stations does not exceed 1.5 kW per channel. (WRC-15)

w) (SUP WRC-19)

Reasons: NBDP has been deleted from the GMDSS, with the exception of MSI on certain frequencies which are contained in RR Appendix **15** and the new ACS system will utilize the frequencies previously used by NBDP for distress and safety communications. Similar footnote with *o)* for NAVTEX is added for the NAVDAT.

MOD USA/4534A11/96

PART B – Channelling arrangements (WRC-15)

Section II – Narrow-band direct-printing telegraphy (paired frequencies)

1 Each coast station which uses paired frequencies is assigned one or more frequency pairs from the following series; each pair consists of a transmitting and a receiving frequency.
2 The speed of the narrow-band direct-printing telegraphy and data systems shall not exceed 100 Bd for FSK and 200 Bd for PSK.

Table of frequencies for two-frequency operation by coast stations (kHz)

Channel No.	4 MHz band		6 MHz band		8 MHz band	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
1	4 210.5	4 172.5	6 314.5	6 263	~~8 376.5~~	~~8 376.5~~
2	4 211	4 173	6 315	6 263.5	8 417	8 377
3	4 211.5	4 173.5	6 315.5	6 264	8 417.5	8 377.5
4	4 212	4 174	6 316	6 264.5	8 418	8 378
5	4 212.5	4 174.5	6 316.5	6 265	8 418.5	8 378.5
6	4 213	4 175	6 317	6 265.5	8 419	8 379
7	4 213.5	4 175.5	6 317.5	6 266	8 419.5	8 379.5
8	4 214	4 176	6 318	6 266.5	8 420	8 380
9	4 214.5	4 176.5	6 318.5	6 267	8 420.5	8 380.5
10	4 215	4 177	6 319	6 267.5	8 421	8 381
11	~~4 177.5~~	~~4 177.5~~	~~6 268~~	~~6 268~~	8 421.5	8 381.5
12	4 215.5	4 178	6 319.5	6 268.5	8 422	8 382
13	4 216	4 178.5	6 320	6 269	8 422.5	8 382.5
14			6 320.5	6 269.5	8 423	8 383
15					8 423.5	8 383.5

Table of frequencies for two-frequency operation by coast stations (kHz)

Channel No.	12 MHz band		16 MHz band		18/19 MHz band	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
1	12 579.5	12 477	16 807	16 683.5		
2	12 580	12 477.5	16 807.5	16 684		
3	12 580.5	12 478	16 808	16 684.5		
4	12 581	12 478.5	16 808.5	16 685		
5	12 581.5	12 479	16 809	16 685.5		
6	12 582	12 479.5	16 809.5	16 686		
7	12 582.5	12 480	16 810	16 686.5	19 684	18 873.5
8	12 583	12 480.5	16 810.5	16 687	19 684.5	18 874
9	12 583.5	12 481	16 811	16 687.5	19 685	18 874.5
10	12 584	12 481.5	16 811.5	16 688	19 685.5	18 875
11	12 584.5	12 482	16 812	16 688.5	19 686	18 875.5
12	12 585	12 482.5	16 812.5	16 689	19 686.5	18 876
13	12 585.5	12 483	16 813	16 689.5	19 687	18 876.5
14	12 586	12 483.5	16 813.5	16 690	19 687.5	18 877
15	12 586.5	12 484	16 814	16 690.5	19 688	18 877.5

Channel No.	12 MHz band		16 MHz band		18/19 MHz band	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
16	12 587	12 484.5	16 814.5	16 691	19 688.5	18 878
17	12 587.5	12 485	16 815	16 691.5	19 689	18 878.5
18	12 588	12 485.5	16 815.5	16 692	19 689.5	18 879
19	12 588.5	12 486	16 816	16 692.5	19 690	18 879.5
20	12 589	12 486.5	16 816.5	16 693	19 690.5	18 880
21	12 589.5	12 487	16 817	16 693.5		
22	12 590	12 487.5	16 817.5	16 694		
23	12 590.5	12 488	16 818	16 694.5		
24	12 591	12 488.5	~~16 695~~	~~16 695~~		
25	12 591.5	12 489	16 818.5	16 695.5		
26	12 592	12 489.5	16 819	16 696		
27	12 592.5	12 490	16 819.5	16 696.5		
28	12 593	12 490.5	16 820	16 697		
29	12 593.5	12 491	16 820.5	16 697.5		
30	12 594	12 491.5	16 821	16 698		
31	12 594.5	12 492	16 821.5	16 698.5		
32	12 595	12 492.5				
33	12 595.5	12 493				
34	12 596	12 493.5				
35	12 596.5	12 494				
36	12 597	12 494.5				
37	12 597.5	12 495				
38	12 598	12 495.5				
39	12 598.5	12 496				
40	12 599	12 496.5				
41	12 599.5	12 497				
42	12 600	12 497.5				
43	12 600.5	12 498				
44	12 601	12 498.5				
45	12 601.5	12 499				

Table of frequencies for two-frequency operation by coast stations (kHz)

Channel No.	12 MHz band (*end*)	
	Transmit	Receive
46	12 602	12 499.5
47	12 602.5	12 500
48	12 603	12 500.5
49	12 603.5	12 501
50	12 604	12 501.5
51	12 604.5	12 502
52	12 605	12 502.5
53	12 605.5	12 503
54	12 606	12 503.5
55	12 606.5	12 504
56	12 607	12 504.5
57	12 607.5	12 505
58	12 608	12 505.5
59	12 608.5	12 506
60	12 609	12 506.5

61	12 609.5	12 507
62	12 610	12 507.5
63	12 610.5	12 508
64	12 611	12 508.5
65	12 611.5	12 509
66	12 612	12 509.5
67	12 612.5	12 510
68	12 613	12 510.5
69	12 613.5	12 511
70	12 614	12 511.5
71	12 614.5	12 512
72	12 615	12 512.5
73	12 615.5	12 513
74	12 616	12 513.5
75	12 616.5	12 514
76	12 617	12 514.5
77	12 617.5	12 515
78	12 618	12 515.5
79	12 618.5	12 516
80	12 619	12 516.5
81	12 619.5	12 517
82	12 620	12 517.5
83	12 620.5	12 518
84	12 621	12 518.5
85	12 621.5	12 519
86	12 622	12 519.5
87	~~12 520~~	~~12 520~~
88	12 622.5	12 520.5
89	12 623	12 521
90	12 623.5	12 521.5
91	12 624	12 522
92	12 624.5	12 522.5

...

Reasons: Introduction of the ACS in RR Appendix **17** using the frequencies of NBDP previously used for distress.

ADD USA/4534A11/97

DRAFT NEW RESOLUTION [A111] (WRC-23)

Coordination of NAVDAT ~~servicessystem~~

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the International Maritime Organization (IMO) has established procedures to coordinate the operational aspects of NAVDAT ~~servicessystem~~, such as allocation of transmitter identification and time schedules, in the planning stages for transmissions on the international frequencies 500 kHz and/or 4 226 kHz and also on the other frequencies which are defined in No. 5.79 and Appendix **15**;

b) that coordination in the frequencies 500 kHz and/or 4 226 kHz and other frequencies which are defined in No. 5.79 and Appendix **15**, is essentially operational,

resolves

to invite administrations to apply the procedures established by IMO, taking into account the IMO NAVDAT Manual, for coordinating the use of the international frequencies 500 kHz and/or 4 226 kHz and also of the other frequencies which are defined in No. 5.79 and Appendix **15**,

instructs the Secretary-General

to invite IMO to provide ITU with information on a regular basis on operational coordination for NAVDAT ~~services~~ system on the international frequencies 500 kHz and/or 4 226 kHz and also on the other frequencies which are defined in No. 5.79 and Appendix **15**,

instructs the Director of the Radiocommunication Bureau

to publish this information in the *List of Coast Stations and Special Service Stations* (List IV) (see No. 20.7).

Reasons: New Resolution for the coordination of the NAVDAT ~~services~~ system identical to the one for the NAVTEX (Resolution **339 (Rev.WRC-07)**).

SUP USA/4534A11/98

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

Reasons: This Resolution is proposed to be suppressed considering the finalization of the studies on WRC-23 agenda item 1.11 covered by *resolves* 1 (modernization of the GMDSS).

XV.

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7 Topic C

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;

7(C) Topic C - Protection of geostationary-satellite networks in the mobile-satellite service operating in the 7/8 GHz and 20/30 GHz bands from emissions of non-geostationary-satellite systems operating in the same frequency bands and identical directions

Background:

Non-GSO systems operating in the frequency bands 7 250-7 750 MHz (space-to-Earth), 7 900-8 400 MHz (Earth-to-space), 20.2-21.2 GHz (space-to-Earth) and 30-31 GHz (Earth-to-space) currently do not require coordination with GSO MSS networks under RR No. **9.11A** (RR Nos. **9.12A** or **9.13**). However, RR No. **9.21** applies to non-GSO MSS satellite systems in the bands covered by RR No. **5.461**.

If an administration is of the view that unacceptable interference may be caused by a non-GSO system in the frequency bands 20.2-21.2 GHz and 30-31 GHz or by non-GSO FSS in the bands 7 250-7 750 MHz and 7 900-8 400 MHz to its existing or planned GSO MSS networks, e.g. by having conducted investigations providing results leading to this view, its comments may be communicated to the notifying administration responsible for the non-GSO system according to RR No. **9.3**. However, sometimes requests for the resolution of difficulties under RR No. **9.3** simply remain unanswered. This could be explained by the absence of clear criteria to be used during technical discussions. Furthermore, considering that resolving difficulties with respect to assignments of non-GSO systems subject to RR No. **9.3** does not have any regulatory implication with respect to the recording of assignments, it appears that the protection of GSO MSS networks is based on a best effort only. It should be noted that this is not the case for assignments to non-GSO MSS systems in the bands covered by RR No. **5.461**. In fact, the unsuccessful application of RR No. **9.21** (i.e. the absence of an agreement) leads to a recording in the MIFR with favourable finding but the recorded assignment is subject to not causing harmful interference nor claiming protection from the assignments of the objecting administration, i.e. the administration having stated its disagreement (see also RR No. **11.31.1**).

Under RR No. **22.2**, non-GSO systems shall not cause unacceptable interference to GSO networks in the fixed-satellite service (FSS) and broadcasting-satellite service (BSS). However, GSO MSS networks are not covered under RR No. **22.2**.

Because of this apparent deficiency in the regulatory framework, the protection of GSO MSS networks from non-GSO systems in these bands is not ensured.

The Unites States proposes changes to RR No. **5.461** and also proposes to add a new provision to Article **22** to clarify the protection of future GSO MSS networks relative to non-GSO systems in the subject frequency bands.

Proposals:
USA-7C/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD

7 250-8 500 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
7 250-7 300	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOD 5.461	
7 300-7 375	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOD 5.461	

MOD

5.461 *Additional allocation:* the frequency bands 7 250-7 375 MHz (space-to-Earth) and 7 900-8 025 MHz (Earth-to-space) are also allocated to the mobile-satellite service on a primary basis, subject to agreement obtained under No. 9.21, with the exception that No. 9.21 shall not apply to the geostationary-satellite networks in the mobile-satellite service for which complete coordination information is received by the Bureau after *[the last day of WRC-23 or the entry into force of the Final Acts of WRC-23]* with respect to non-geostationary-satellite systems for which complete coordination information is received by the Bureau after *[the last day of WRC-23 or the entry into force of the Final Acts of WRC-23]*. (Rev. WRC-23)

Reason: This change makes it clear that GSO MSS networks filed after the coming into force of this modified provision no longer need to secure the agreement of previously filed non-GSO systems under No. **9.21.**

USA-7C/2

ARTICLE 22

Space services[1]

Section II − Control of interference to geostationary-satellite systems

ADD

22.2*bis* In the frequency bands 7 250-7 750 MHz (space-to-Earth), 7 900-8 025 MHz (Earth-to-space), 20.2-21.2 GHz (space-to-Earth) and 30-31 GHz (Earth-to-space), non-geostationary-satellite systems for which complete coordination or notification information, as appropriate, is received by the Bureau after *[the last day of WRC-23 or the entry into force of the Final Acts of WRC-23]* shall not cause unacceptable interference to and shall not claim protection from geostationary-satellite networks in the mobile-satellite service and which are operating in accordance with these Regulations. No. 5.43A does not apply in this case. (WRC-23)

Reason: This additional provision clarifies the protection of GSO MSS networks after the coming into force of this new provision relative to new non-GSO systems.

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

Mr. Tom Sullivan
Chief, International Bureau
Federal Communications
Commission 45 L Street NE
Washington, DC 20554

Dear Mr. Sullivan:

The National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch agencies, provides the attached revised WRC-23 proposals for Agenda Items Agenda Items 4 for suppression of Res 75, 160, and 161, agenda item 8 to align its country footnote No. **5.394** in the Radio Regulations with the actual usage of the aeronautical mobile service for telemetry in the United States, and agenda item 10 to confirm preliminary agenda item 2.8 and to make necessary adjustments to the resolution as well as a separate new agenda item to address cislunar communications.

NTIA looks forward to working with FCC in reconciling these proposals for submission to CITEL PCC II as U.S. proposals. Our point of contact is Mr. Charles Glass, NTIA's WRC Coordinator, who can be reached at (202) 714-1763 or cglass@ntia.gov.

Sincerely,

Steve Molina March 15, 2023

Steve Molina
Deputy Associate Administrator
Office of Spectrum Management

Enclosures (5)

World Radiocommunication Conference (WRC-23)
Dubai, 20 November - 15 December 2023

PLENARY MEETING

Addendum 21 to
Document 4620-E
20 January 2023
Original: English

United States of America

Proposals for the work of the conference

Agenda item 4

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;

SUP USA/4620A21/1

RESOLUTION 75 (REV.WRC-12)

Development of the technical basis for determining the coordination area for coordination of a receiving earth station in the space research service (deep space) with transmitting stations of high-density applications in the fixed service in the 31.8-32.3 GHz and 37-38 GHz bands

The World Radiocommunication Conference (Geneva, 2012),

Reasons: Resolution **75 (Rev.WRC-12)** deals with the development of the technical basis for determining the coordination area for coordination of a receiving earth station in the space research service (deep space) with transmitting stations of high-density applications in the fixed service in the 31.8-32.3 GHz and 37-38 GHz bands. Technical elements requested by this Resolution have been developed (Recommendations ITU-R F.1760, F.1765 approved in 2006), and no recent activity has been performed since then. Therefore, this Resolution could be considered as implemented and could be suppressed.

XVI. UNITED STATES OF AMERICA

XVII. DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 4: *in accordance with Resolution **95 (Rev.WRC-07)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;*

BACKGROUND INFORMATION:

The review of Resolutions and Recommendations of previous Conferences is a standing agenda item. Based on membership proposals, WRC-23 shall conclude on whether there is a need for any modification or suppression of Resolutions or Recommendations from previous Conferences.

The United States reviewed Resolutions and Recommendations of previous conferences and makes proposals for modification, suppression or reasoned decision to abstain from changes as follows.

Proposals

SUP USA/AI4/1

RESOLUTION 160 (WRC-15)

Facilitating access to broadband applications delivered by high-altitude platform stations

Reason: This Resolution should have been suppressed by WRC-19 as a consequence of completing the work on WRC-19 Agenda Item 1.14. The failure to suppress appears to be an administrative oversight.

SUP USA/AI4/2

RESOLUTION 161 (WRC-15)

Studies relating to spectrum needs and possible allocation of the frequency band 37.5-39.5 GHz to the fixed-satellite service

Reason: This Resolution should have been suppressed by WRC-19 as a consequence of decision not to pursue this topic as a future agenda item. The failure to suppress appears to be an administrative oversight.

XVIII. UNITED STATES OF AMERICA

XIX. DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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

BACKGROUND INFORMATION:

A review of the Table of Frequency Allocations as implemented in the national rules of the United States revealed an inconsistency between the actual usage of the aeronautical mobile service for telemetry and its priority over other uses of by the mobile services and what is recorded in RR No. **5.394**. In the United States, the use of the band 2 360-2 395 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services.

PROPOSAL

The United States proposes to align its country footnote No. **5.394** in the Radio Regulations with the actual usage of the aeronautical mobile service for telemetry in the United States.

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD USA/4252A23/1

5.394 In the United States, the use of the band 2 3600-2 3950 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services. In Canada, the use of the band 2 360-2 400 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services. (WRC-2307)

Reasons: To align the footnote with the actual usage of the aeronautical mobile service for telemetry in the United States.

United States of America

DRAFT Proposals for the work of the conference

Agenda item 10

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,

BACKGROUND INFORMATION:

Space station operations in low-Earth orbit are increasing at a rapid rate for scientific, academic and commercial purposes. These operations vary in size from as large as the International Space Station to as small as single unit cubesats and have widely ranging data requirements. All of these systems have one thing in common, the need to move data down to Earth in an efficient and cost-effective manner.

Telecommunications satellites offer a ready means to fulfill this need. The possibility for satellite-to-satellite links is particularly appealing when there is a need to relay data to a desired earth station and is likely practicable where the satellite-to-satellite link is being transmitted in the same general direction (e.g., Earth-to-space or space-to-Earth) within the receive or transmit beam of the higher orbital altitude space station. WRC-23 agenda item 1.17 is considering regulatory recognition for satellite-to-satellite operations in certain frequency bands allocated to the fixed-satellite service (FSS). Sharing studies completed by ITU-R WP4A have demonstrated compatibility with existing services and have identified the technical and operational provisions needed to ensure protection of existing services.

WRC-19 recognized that mobile-satellite service (MSS) systems could also play an important role in fulfilling some of the lower data rate needs of low-Earth orbiting space stations in relaying data to the ground and included agenda item 2.8 on the preliminary agenda for WRC-27.

PROPOSAL:

Because frequency bands allocated to the MSS are used for links between space stations and mobile earth stations, it is necessary to analyze the use of the same bands for satellite-to-satellite links to ensure compatibility with all existing services. In addition, the sharing scenario is likely to differ as the orbital characteristics of the linked satellites vary. The United States of America supports the inclusion of agenda item 2.8 on the WRC-27 agenda with the modifications provided.

Proposals

ADD USA/1

DRAFT NEW RESOLUTION [USA-2027]

Agenda for the 2027 World Radiocommunication Conference

The World Radiocommunication Conference (TBD United Arab Emirates, 2023),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for WRC-27 should be established four to six years in advance;

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

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

resolves to give the view

that the following items should be included in the preliminary agenda for WRC-27:

1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-23;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-23, to consider and take appropriate action in respect of the following items:

[…]

2.8 to study the technical and operational matters, and regulatory provisions, for space-to-space links in the frequency bands ~~[~~1 525-1 544 MHz~~]~~, ~~[~~1 545-1 559 MHz~~]~~, ~~[~~1 610-1 645.5 MHz~~]~~, ~~[~~1 646.5-1 660.5 MHz~~]~~ and ~~[~~2 483.5-2 500 MHz~~]~~ among non-geostationary and geostationary satellites operating in the mobile-satellite service, in accordance with Resolution **249 (Rev WRC-23)**;

[…]

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-27;

2 to submit a draft Report on any difficulties or inconsistencies encountered in the application of the Radio Regulations referred in agenda item 10.2 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.

Reasons: to add an agenda item for the study of satellite-to-satellite links in certain frequency bands allocated to the mobile-satellite service.

MOD USA/2

RESOLUTION 249 (REV. WRC-~~19~~23)

Study of technical and operational issues and regulatory provisions for space-to-space transmissions in the Earth-to-space direction in the frequency bands ~~[~~1 610-1 645.5 and 1 646.5-1 660.5 MHz~~]~~ and the space-to-Earth direction in the frequency bands ~~[~~1 525-1 544 MHz~~]~~, ~~[~~1 545-1 559 MHz~~]~~, ~~[~~1 613.8-1 626.5 MHz~~]~~ and ~~[~~2 483.5-2 500 MHz~~]~~ among non-geostationary and geostationary satellites operating in the mobile-satellite service~~*~~

The World Radiocommunication Conference (~~Sharm el-Sheikh, 2019~~TBD United Arab Emirates, 2023),

considering

a) that the definition of mobile-satellite service (MSS) in No. **1.25** includes communication between space stations;

b) that the definition of inter-satellite service (ISS) in No. **1.22** includes only links between space stations, and that the term *inter-satellite link* in this resolution is taken to mean a radiocommunication service link between artificial satellites;

c) that many non-geostationary-satellite orbit (non-GSO) satellites operate with limited and non-real-time connectivity to earth stations;

d) that by utilizing space-to-space communication between such non-GSO satellites and ~~geostationary-satellite orbit (GSO)~~ MSS satellites operating at higher orbital altitudes to relay data to/from the ground, data can be made available in near-real time across a much greater portion of the non-GSO satellite's orbit, enhancing the availability and value of instrument data for low latency applications~~would enhance the security and efficiency of operations~~;

e) that MSS satellites operating in the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660.5 MHz and 2 483.5-2 500 MHz ~~can~~ could support these types of operation;

f) that using the frequency bands 1 610-1 645.5 MHz and 1 646.5-1 660.5 MHz allocated to the MSS (Earth-to-space) for transmissions in the Earth-to-space direction from non-GSO MSS space stations towards MSS space stations operating at higher orbital altitudes, including GSO, may increase spectral ~~efficiency~~ utilization in these frequency bands;

g) that using the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 613.8-1 626.5 MHz and 2 483.5-2 500 MHz allocated to the MSS (space-to-Earth) for transmissions in the space-to-Earth direction from MSS space stations operating at higher orbital altitudes, including GSO, towards non-GSO MSS satellites, may increase spectral ~~efficiency~~ utilization in these frequency bands;

h) that all MSS allocations in the above frequency bands include a space-to-Earth or Earth-to-space direction indicator, but do not include a space-to-space direction indicator;

i) that the ITU Radiocommunication Sector (ITU-R) has begun preliminary studies on the technical and operational issues associated with the operation of space-to-space links between non-GSO MSS satellites and GSO MSS satellites in the above frequency bands, but no studies have been conducted on the technical and operational issues associated with the operation of space-to-space links between non-GSO MSS satellites and non-GSO MSS satellites in the above frequency bands;

j) that it is technically feasible for a lower orbital altitude non-GSO space station to transmit data to and receive data from a higher orbital altitude non-GSO or GSO space station when passing within the satellite antenna coverage beam that is directed towards the Earth;

k) that several satellite systems have been relying on satellite-to-satellite communication in existing satellite frequency bands under No. **4.4**, and such reliance on No. **4.4** does not provide a sound basis for

~~* The appearance of square brackets around certain frequency bands in this Resolution is understood to mean that WRC-23 will consider and review the inclusion of these frequency bands with square brackets and decide, as appropriate.~~

continued development of such systems nor the confidence in commercial viability and availability of the service to the end users;

l) that there is growing interest for utilizing space-to-space satellite links for a variety of applications;

m) that a precedent for space-to-space links sharing with Earth-to-space links ~~and~~ or space-to-Earth links exists for the space operation, Earth exploration-satellite and space research services in ~~the~~ other frequency bands ~~2 025-2 110 MHz and 2 200-2 290 MHz~~ through the inclusion of a space-to-space ~~allocation~~direction indicator,

recognizing

a) that it is necessary to study the impact on other services, as well as Earth-to-space and space-to-Earth operation within the MSS, of the operation of inter-satellite links in the above frequency bands, taking into account applicable footnotes to the Table of Frequency Allocations, to ensure compatibility with all primary allocated services in these frequency bands and the adjacent frequency bands and avoid harmful interference;

b) that there should be no additional regulatory or technical constraints imposed on primary services to which the frequency band and adjacent frequency bands are currently allocated;

c) that it is necessary to study whether space-to-Earth direction transmissions from space stations at higher orbital altitudes, including GSO, can be successfully received by lower orbital altitude non-GSO satellites, without imposing any additional constraints on all allocated services in these frequency bands;

d) that the sharing scenarios may vary widely because of the wide variety of orbital characteristics of the non-GSO MSS space stations;

e) that out-of-band emissions, signals due to antenna pattern sidelobes, ~~reflections from receiving space stations~~ and in-band unintentional radiation due to Doppler shifts may impact services operating in the same and adjacent or nearby frequency bands;

f) that currently the only option for MSS space stations in the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646-1 660.5 MHz and 2 483.5-2 500 MHz needing to communicate with other orbital space stations is to operate under No. **4.4**, without recognition and on a non-harmful interference/non-protected basis in frequency bands allocated to another space service;

g) that RR No. 5.356 states that the use of the band 1 544-1 545 MHz by the mobile-satellite service (space-to-Earth) is limited to distress and safety communications (see Article 31);

h) that RR Nos. **5.357A** and **5.362A** provide priority for accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service in the frequency bands 1545-1555 and 1646.5-1656.5 MHz, and 1555-1559 and 1656.5-1660.5 MHz, respectively,

recognizing further

a) that the use of frequency bands by the MSS in the frequency range 1-3 GHz is subject to existing Resolutions, coordination requirements and country footnotes taking into account, in particular, the protection of safety services and aeronautical mobile-satellite (R) services, and of the Global Maritime Distress and Safety System;

b) that the fixed and mobile services are allocated on a primary basis in the frequency band 2 483.5-2 500 MHz on a global basis and that the fixed service is also allocated on a primary basis in the frequency band 1 525-1 530 MHz in Regions 1 and 3;

c) that the radionavigation-satellite service is allocated on a primary basis in the frequency band 1 559-1 610 MHz for both space-to-Earth and space-to-space use~~,~~;

d) that the radio astronomy service is extremely susceptible to interference from space and airborne transmitters (see Article **29**), and the location on space stations of transmitters operating in both the space-to-Earth and the Earth-to-space direction for the purpose of enacting inter-satellite links presents a new operating scenario,

noting

a) that section 3.1.3.2 of the Director's Report to ~~this conference~~WRC-23 ~~highlights~~ highlighted that the Radiocommunication Bureau has received an increased number of Advance Publication Information (API) submissions for non-GSO networks in frequency bands which are not allocated by Article **5** for the type of service foreseen, including satellite network filings for inter-satellite applications in frequency bands allocated only in the Earth-to-space or space-to-Earth directions;

b) that the Director's Report ~~concludes~~ concluded that, in view of recent technical developments and the increasing number of submissions of inter-satellite links in frequency bands not allocated to the ISS or to

a space service in the space-to-space direction, this conference may wish to consider means to give recognition to these uses based on the conditions derived from studies by ITU-R Working Parties 4A and 4C in order to avoid interfering with existing systems operating in the same frequency bands,

resolves to invite the ITU Radiocommunication Sector

1 to study the technical and operational characteristics of different types of non-GSO MSS space stations that operate or plan to operate space-to-space links with GSO MSS networks in the following frequency bands:

a) Earth-to-space direction in the frequency bands ~~[~~1 626.5-1 645 5 MHz and 1 646.5-1 660.5 MHz~~]~~; and

b) space-to-Earth direction in the frequency bands ~~[~~1 525-1 544 MHz and 1 545-1 559 MHz~~]~~;

2 to study the technical and operational characteristics, including those listed in *recognizing e)*, of ~~different~~ typical types of non-GSO MSS space stations that operate or plan to operate space-to-space links with non-GSO MSS systems and GSO MSS networks in the following frequency bands:

a) Earth-to-space direction in the frequency band ~~[~~1 610-1 626.5 MHz~~]~~; and

b) space-to-Earth direction in the frequency bands ~~[~~1 613.8-1 626.5 MHz and 2 483.5-2 500 MHz~~]~~;

3 to study sharing and compatibility between space-to-space links in the cases described in *resolves to invite the ITU Radiocommunication Sector* 1 and 2 and

– current and planned stations of the MSS;

– other existing primary services allocated in the same frequency bands taking into account, in particular, recognizing *h*; ~~and~~

– other existing primary services allocated in adjacent frequency bands where those services are not also allocated in the aforementioned frequency bands; and

– existing passive services and safety services allocated in adjacent frequency bands,

in order to ensure protection of, and not impose undue constraints on, other MSS operations and other services allocated in those frequency bands and in adjacent frequency bands, taking into account *recognizing further a)* to *d~~e~~)*;

4 to develop technical conditions and regulatory provisions for the operation of space-to-space links in these frequency bands, including new or revised MSS allocations or the addition of ISS allocations~~, on a secondary basis,~~ while ensuring the protection of, and without imposing additional constraints on, other MSS operations or services allocated in those and adjacent frequency bands, taking into account the results of the studies called for in *resolves to invite the ITU Radiocommunication Sector* 1, 2, and 3 above;

5 to complete these studies by WRC-27,

invites administrations

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

invites the 2027 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate.

World Radiocommunication Conference (WRC-23)
Dubai, 20 November - 15 December 2023

PLENARY MEETING

Addendum 27 to
Document 4253-E
30 June 2022
Original: English

United States of America

Proposals for the work of the conference

Agenda item 10

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

BACKGROUND INFORMATION:

The Artemis Accords[41] lay out a shared vision for principles, established in the Outer Space Treaty of 1967, for cooperation in the civil exploration and use of the Moon, Mars, comets and asteroids for peaceful purposes. The United States space agency, NASA, and space agencies from other ITU Member States, are preparing for a return of human and robotic explorers to the Moon while developing spacecraft, surface vehicles, exploration mission plans toward achieving a sustainable and robust presence on the Moon in the next decade.

In addition to the traditional means of space-to-Earth and Earth-to-space communication links, direct communications between landers, rovers, extravehicular activity (EVA) astronauts conducting sortie missions and experiments is crucial to enable effective scientific activities and consideration of the health of the crew in the lunar environment. Initial surveys of available technologies has indicated that a network based on the 3GPP standard can be capable of servicing the reference mission concept of operation involving many user groups over a widespread surface area with high data throughput requirements. However, considering the unique topology of the Moon's surface, shielded zone of the Moon considerations, unique science opportunities in radio astronomy, and remote sensing in the lunar region/surface, careful consideration and spectrum sharing/compatibility studies are required to determine the suitable bands to support the envisioned lunar surface network using the 3GPP standard or other standards.

PROPOSAL:

The United States proposes an agenda item for WRC-27 to study the feasibility and compatibility of a new allocation to the space research service (space-to-space) for point-to-multipoint networks located on the lunar surface between a base station and EVA/rovers up to a 50 km radius. The frequency ranges of interest are: 390-450 MHz, 2 400-2 700 MHz, 3 500-3 800 MHz, 5 150-5925 MHz, and 25.25-28.35 MHz.

[41] As of July 2022 the Artemis Accords were signed by the governments of: Australia, Bahrain, Brazil, Canada, Colombia, France, Israel, Italy, Japan, the Republic of Korea, Luxembourg, Mexico, New Zealand, Poland, Romania, Saudi Arabia, Singapore, Ukraine, the United Arab Emirates, the United Kingdom, and the United States.

Proposals

ADD USA/4253A27/1

DRAFT NEW RESOLUTION [USA-A2027]

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 WRC-27;

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 WRC-19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

[…]

1.X to conduct studies on the spectrum needs and regulatory measures for possible new allocations to the space research service (space-to-space) to support point-to-multipoint systems on the lunar surface in the frequency bands 390-450 MHz, 2 400-2 700 MHz, 3 500-3 800 MHz, 5 150-5 925 MHz, and 25.25-28.35 GHz in accordance with Resolution [**USA-B2027] (WRC-23)**;

[…]

invites the ITU Council

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

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting (CPM) and to prepare a report to WRC-23;

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

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To create an agenda item for WRC-27 to study the feasibility and compatibility of a new allocation to the space research service (space-to-space) for point-to-multipoint networks located on the lunar surface in certain frequency bands.

ADD USA/4253A27/2

DRAFT NEW RESOLUTION [USA-B2027]

Studies on frequency-related matters, including possible additional allocations to the space research service (space-to-space), for future development of point-to-multipoint communications on the lunar surface

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is increased interest by space research service operators from multiple Member States to conduct scientific experiments and exploration activities in the vicinity of the Moon, including on its surface;

b) that point-to-multipoint communication technology is well-developed and widely deployed on the Earth using industry standards to ensure compatibility with other services;

c) that the definition of *radiocommunication service* contained in RR No. **1.19** limits the definitions of the *fixed* and *mobiles* service to apply only to *terrestrial radiocommunication*;

d) that the average distance between the Earth and the Moon is 382 500 km and, therefore, within the 2×10^6 km range provided in RR No. **1.177** to define deep space;

e) that point-to-multipoint systems that would operate on the lunar surface would require an operating range of no more than approximately 50 km;

f) that point-to-multipoint systems on the lunar surface could operate in the space research service (space-to-space);

g) that the lunar surface has unique atmospheric, soil, and topography conditions;

h) that the benefits of scientific discovery and space exploration are of a global nature,

noting

Section V of Article **22** regarding protection of radio astronomy in the shielded zone of the Moon,

noting further

that the Artemis accords which promote safe, sustainable, and responsible space exploration have been signed by ITU Member States from all three Regions,

recognizing

that studies of sharing and compatibility between point-to-multipoint systems operating under the space research service (space-to-space) on the lunar surface would need to take into account any other allocated services in the same or, as appropriate, adjacent bands,

resolves to invite the ITU Radiocommunication Sector

1 to study spectrum needs of the space research service limited to point-to-multipoint systems which may operate on the lunar surface in the frequency bands 390-450 MHz, 2 400-2 700 , 3 500-3 800 MHz, 5 150-5925 MHz, and 25.25-28.35 GHz;

2 to study the propagation considerations for point-to-multipoint systems operating in the frequency ranges in *resolves to invite the ITU Radiocommunication Sector* 1 on the lunar surface;

3 to study sharing and compatibility between the systems identified in *resolves to invite the ITU Radiocommunication Sector* 1 and other services allocated to and, as appropriate, in adjacent bands;
4 to complete these studies by WRC-27,

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

invites the 2027 World Radiocommunication Conference
to consider the results of the above studies and take necessary regulatory actions, as appropriate, to provide additional allocations to the space research service (space-to-space) for the purposes facilitating point-to-multipoint systems operating on the lunar surface.

Reasons: To provide a Resolution supporting the agenda item.

ATTACHMENT

DRAFT PROPOSAL FOR AGENDA ITEM

Subject: Propose a WRC-27 agenda item to study possible allocation to SRS (s-s) for lunar surface EVA/Rover comm, within 50 km radius of a base station.

Origin: United States of America

Proposal: to add to the Table of Frequency Allocations a new primary allocation of Space Research Service in the space-to-space direction in the frequency ranges, in accordance with **Resolution [USA-B2027] (WRC-23)**.

Background/reason:

The Artemis Accords lays out a shared vision for principles, grounded in the Outer Space Treaty of 1967, for cooperation in the civil exploration and use of the Moon, Mars, Comets and Asteroids for peaceful purposes. NASA and numerous space agencies around the world, as partners in the Artemis missions, are preparing for a return of human to the Moon while developing spacecraft, surface vehicles, exploration mission plans toward achieving a sustainable and robust presence on the Moon in the next decade. In addition to the tradition means of space-to-Earth and Earth-to-space communication links, direct communications between landers, rovers, extravehicular activity (EVA) astronauts conducting sortie missions and experiments is crucial to enable effective scientific activities consideration the health of the crew in the lunar environment. Initial survey of available technologies has indicated that a network based on 3GPP standard can be capable of servicing reference mission concept of operation involving many user groups over a widespread surface area with high data throughput requirements. However, considering the potential unique topology of the Moon surface, shielded zone of the Moon considerations, unique science opportunities in radio astronomy and remote sensing in the lunar region/surface, careful consideration and spectrum sharing/compatibility studies are required to determine the suitable spectrum bands to support the envisioned 3GPP standard based lunar surface network.

This future conference agenda item proposes to study the compatibility of a new SRS (space-to-space) allocation for a point-to-multipoint network between a base station and EVA/rovers up to 50 km radius. The frequency ranges of interests are: 390-450 MHz, 2 400-2 700 , 3 500-3 800 MHz, 5 150-5925 MHz, and 25.25-28.35 GHz.

Radiocommunication services concerned: radiodetermination-satellite service, radionavigation-satellite service, radio astronomy service, active and passive remote sensing systems, space operation and space research services.

Indication of possible difficulties: none foreseen

Previous/ongoing studies on the issue: none

Studies to be carried out by: WP 7B	***with the participation of:*** WPs 4C, 7C, 7D

ITU-R Study Groups concerned: SG 7

ITU resource implications, including financial implications (refer to CV126): minimal

Common regional proposal: TBD	***Multi-country proposal:*** No ***Number of countries:***

Remarks

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

Mr. Tom Sullivan
Chief, International Bureau
Federal Communications
Commission 45 L Street NE
Washington, DC 20554

Dear Mr. Sullivan:

The National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch agencies, provides the attached revised WRC-23 proposals for Agenda Items Agenda Items 1.13 addressing examination of a possible upgrade to primary status to SRS in the frequency range 14.8-15.35 GHz, 7 Topic A addressing tolerances for certain orbital characteristics of non-GSO space stations of the FSS, BSS or MSS, and 10 addressing changes to Appendix 26 for wideband HF communications.

NTIA looks forward to working with FCC in reconciling these proposals for submission to CITEL PCC II as U.S. proposals. Our point of contact is Mr. Charles Glass, NTIA's WRC Coordinator, who can be reached at (202) 714-1763 or cglass@ntia.gov.

Sincerely,

Steve Molina March 21, 2023

Steve Molina
Deputy Associate Administrator
Office of Spectrum Management

Enclosures (3)

World Radiocommunication Conference (WRC-23)
[Abu Dhabi or Dubai], 20 November - 15 December 2023

PLENARY MEETING

Addendum 13 to
Document 4226-E
18 May 2022
Original: English

United States of America

Proposals for the work of the conference

Agenda item 1.13

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)**;

BACKGROUND INFORMATION

The frequency band 14.8-15.35 GHz is currently allocated on a primary basis to the fixed and mobile services, and on a secondary basis to the space research service (SRS). Within the SRS, the band is expected to enable high-speed science data return from space science missions to a limited number of earth stations located globally. Additionally, the 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 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.

PROPOSAL

Based on sharing and compatibility studies with existing systems of incumbent services, existing space research service operations in the frequency band 14.8-15.35 GHz, and current domestic policy which allocates this band on a primary basis to the space research service, the United States supports upgrading the space research service (space-to-space) from secondary to primary and retaining other uses of the SRS allocation (space-to-Earth and Earth-to-space) in a secondary status at WRC-23 under Agenda Item 1.13.

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD USA/4226A13/1

14.5-15.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14.5-14.75	FIXED FIXED-SATELLITE (Earth-to-space) 5.509B 5.509C 5.509D 5.509E 5.509F 5.510 MOBILE Space research 5.509G	
14.75-14.8 FIXED FIXED-SATELLITE (Earth-to-space) 5.510 MOBILE Space research 5.509G		**14.75-14.8** FIXED FIXED-SATELLITE (Earth-to-space) 5.509B 5.509C 5.509D 5.509E 5.509F 5.510 MOBILE Space research 5.509G
14.8-15.35	FIXED MOBILE Space research (space-to-Earth) (Earth-to-space) SPACE RESEARCH (space-to-space) 5.339	
15.35-15.4	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.511	

Reasons: To upgrade the existing space research (space-to-space) from secondary allocation to primary in the frequency band 14.8-15.35 GHz.

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section V − Limits of power flux-density from space stations

MOD USA/4226A13/2

TABLE **21-4** (*CONTINUED*) (REV.WRC-~~19~~23)

Frequency band	Service*	Limit in dB(W/m^2) for angles of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
…	…	…	…	…	…
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **5.494** and **5.496**) 11.7-12.7 GHz (Region 2) 11.7-12.75 GHz (Region 3)	Fixed-satellite (space-to-Earth) (non-geostationary-satellite orbit) [25]	−124	−124 + 0.5(δ − 5)	−114	1 MHz
12.2-12.75 GHz [7] (Region 3) 12.5-12.75 GHz [7] (Region 1 countries listed in Nos. **5.494** and **5.496**)	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	−148	−148 + 0.5(δ − 5)	−138	4 kHz

13.4-13.65 GHz (Region 1)	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	**0°-25°**	**25°-80°**	**80°-84°**	**84°-90°**	4 kHz
		−159 + 0.4δ [19]	−149 [19]	−149 − 0.5(δ − 80) [19]	−151 [19]	
14.8-15.35 GHz	Space research (space-to-space)	**0°-5°**	**5°-25°**		**25°-90°**	1 MHz
		-124	−124 + 0.5(δ − 5)		−114	
17.7-19.3 GHz [7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	**0°-5°**	**5°-25°**		**25°-90°**	1 MHz
		−115 [14, 15] or −115 − *X* [13]	−115 + 0.5(δ − 5) [14, 15] or −115 − *X* + ((10 + *X*)/20) (δ − 5) [13]		−105 [14, 15] or −105 [13]	
17.7-19.3 GHz [7, 8]	Fixed-satellite (space-to-Earth)	**0°-3°**	**3°-12°**	**12°-25°**	−105 [16]	1 MHz
		−120 [16]	−120 + (8/9) (δ − 3) [16]	−112 + (7/13) (δ − 12) [16]		
…	…	…	…	…	…	…

Reasons: The power flux density limits proposed to be added in Table 21-4 for the space research service (s-s) will provide the required protection levels to the fixed and mobile services, including LMS and AMS.

SUP USA/4226A13/6

RESOLUTION 661 (WRC-19)

Examination of a possible upgrade to primary status of the secondary allocation to the space research service in the frequency band 14.8-15.35 GHz

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

Reasons: This Resolution is no longer necessary.

XX. UNITED STATES OF AMERICA

XXI. DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 7: *to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)**, in order to facilitate 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 of the FSS, BSS or MSS*

BACKGROUND INFORMATION:

WRC-19 invited the ITU-R to study "as a matter of urgency, tolerances for certain orbital characteristics of non-GSO space stations of the fixed-satellite, mobile-satellite or broadcasting satellite services to account for potential differences between the notified and deployed orbital characteristics for 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."[1] ITU-R studies conducted to date agree that there should be allowable differences between the values recorded in the Master International Frequency Register (MIFR) for the specified orbital characteristics of non-GSO space stations operating on notified frequency assignments and those representative of the actual deployment of these non-GSO space stations.

[1] See WRC-19 Document CMR19/571 (10th Plenary Minutes), Section 10.5, paragraph 2.

There are multiple aspects involved here. On the one hand, as indicated in Section 4/7/1.3 of the CPM Report for WRC-23 on this Topic: "Deviations from the nominal parameters characterizing the notified plane (A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i), have an impact on the regulatory treatment by the Bureau of the confirmation of the BIU, the BBIU or the Resolution **35 (WRC-19)** submission. These deviations could also have a major impact on the interference environment of such a system, and thereby could impact the efficient use of the non-GSO spectrum resource. The same section of the CPM Report also indicates that "design considerations, the need to ensure safe flight operations between satellites in the same and/or other systems, inter-alia, can lead to notifying administrations needing to operate some space stations in orbital parameters that are at variance from the notified orbital parameters or to employ orbital practices that do not increase interference or protection requirements." The CPM Report goes on to recognize that there are legitimate reasons for variations from notified orbital plane parameters, and that it is important not to over-regulate deviations/tolerances in a way that limits administrations' flexibility or to inappropriately limit entry of additional systems.

The CPM Report for WRC-23, addressing the studies, made the following important observation (in Section 4/7/1.3):

> Although studies have been conducted . . . with a view to identifying allowable deviation/tolerance values for altitudes of apogee/perigee and inclination for a space station in a non-GSO notified orbit, there has been no definitive conclusion on an allowable limit for any of these parameters that would both provide certainty and not unnecessarily constrain efficient use of the orbital/spectrum resource by non-GSO systems.

There simply is no maximum value for allowable deviations on any parameter that would meet both objectives stated above. A limitation on altitude variations, for example, could be unnecessarily restrictive from an interference standpoint to systems that exceed the limit, while also permitting increases in interference from systems that meet the limit.

The proposals below balance the interest in a stable interference environment and the need to avoid overregulating orbital tolerances. The proposals call for periodic reporting for awareness, and for provision of assurances that any deviations in altitude and inclination in circular-orbit non-GSO systems cannot result in an increase in interference to or an increase in required protection from other users of the orbital/spectrum resource. The proposals also require an explanatory statement of the reason for the deviation from the notified parameters, as well as a new filing or modification if the interference environment is changed with respect to any other satellite system.

By requiring specific showings at the bringing into use/bringing back into use and Resolution **35 (WRC-19)** milestone stages (where applicable), and periodically thereafter, the mechanism below provides transparency for non-GSO system operators and administrations. The mechanism also addresses the impact on the interference/protection requirements caused by modifying orbital elements. The mechanism also affords all non-GSO systems the ability to maintain operational flexibility without facing unnecessary regulatory constraints.

Proposals:

MOD USA/7A/1

11.44C A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service, the mobile-satellite service or the broadcasting-satellite service shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the notified orbital plane(s)MOD27 of the non-geostationary satellite network or system for a continuous period of 90

days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau within 30 days from the end of the 90-day period[25, 28, 29]. On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-~~19~~23)

MOD

[27] **MOD11.44C.1** and **MOD11.44D.1** For the purposes of No. **11.44C** or No. **11.44D**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.~~5.e~~4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **[B7(A)] (WRC-23)** shall apply. (WRC-~~19~~23)

Reasons: To incorporate a mandatory reference to a new WRC Resolution addressing allowable deviations on elements of a notified orbital plane, and to correct an erroneous reference to Appendix **4**.

MOD USA/7A/2

11.44D A frequency assignment to a space station in a non-geostationary satellite orbit network or system with "Earth" as the reference body, other than a frequency assignment to which No. 11.44C applies, shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed on one of the notified orbital plane(s)[MOD 27] of the non-geostationary satellite network or system, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system. The notifying administration shall so inform the Bureau as soon as possible, but not later than 30 days after the end of the period referred to in No. 11.44.[25, 29] On receipt of the information sent under this provision, the Bureau shall make that information available on the ITU website as soon as possible and shall publish it in the BR IFIC subsequently. (WRC-~~19~~23)

Reasons: Consequential to the modification of Nos. 11.44C and 11.44C.1 under Proposal USA/7A/1 above.

MOD USA/7A/3

11.49 Wherever the use of a recorded frequency assignment to a space station of a satellite network or to all space stations of a non-geostationary-satellite system is suspended for a period exceeding six months, the notifying administration shall inform the Bureau of the date on which such use was suspended. When the recorded assignment is brought back into use, the notifying administration shall, subject to the provisions of Nos. 11.49.1, 11.49.2, 11.49.3 or 11.49.4, as applicable, so inform the Bureau, as soon as possible. On receipt of the information sent under this provision, the Bureau shall make that information available as soon as possible on the ITU website and shall publish it in the BR IFIC. The date on which the recorded assignment is brought back into use[32, 33, 34, 35, MOD 36] shall be not later than three years from the date on which the use of the frequency assignment was suspended, provided that the notifying administration informs the Bureau of the suspension within six months from the date on which the use was suspended. If the notifying administration informs the Bureau of the suspension more than six months after the date on which the use of the frequency assignment was suspended, this three-year time period shall be reduced. In this case, the amount by which the three-year period shall be reduced shall be equal to the amount of time that has elapsed between the end of the six-month period and the date that the Bureau is informed of the suspension. If the notifying administration informs the Bureau of the suspension more than 21 months after the date on which the use of the frequency assignment was suspended, the frequency assignment shall be cancelled. Ninety days before the end of the period of suspension, the Bureau shall send a reminder to the notifying administration. If the Bureau does not receive the declaration of the

commencement of the bringing back into use period within thirty days following the limit date of the period of suspension established in accordance with this provision, it shall cancel the entry in the Master Register. The Bureau shall, however, inform the administration concerned before taking such action. (WRC-~~19~~23)

MOD

[36] **MOD11.49.5** For the purposes of Nos. **11.49.2** and **11.49.3**, the term "notified orbital plane" means an orbital plane of the non-geostationary-satellite system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.~~5.e~~4.1 (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**. For frequency assignments to some non-geostationary-satellite systems in specific frequency bands and services, Resolution **[B7(A)] (WRC-23)** shall apply. (WRC-~~19~~23)

Reasons: To incorporate a mandatory reference to a new WRC Resolution addressing allowable deviations on elements of a notified orbital plane, and to correct an erroneous reference to Appendix **4**.

ADD USA/7A/4

DRAFT NEW RESOLUTION [B7(A)] (WRC-23)

An approach to orbital tolerances for the implementation and use of frequency assignments to space stations in a non-geostationary-satellite system in specific bands and services

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that filings for frequency assignments to circular-orbit non-geostationary-satellite (non-GSO) systems composed of hundreds to thousands of non-GSO satellites have been received by ITU since 2011, in particular in frequency bands allocated to the fixed-satellite service (FSS) or the mobile-satellite service (MSS);

b) that non-GSO systems using highly-inclined orbits having an apogee altitude greater than 18 000 km and an orbital inclination between 35° and 145° are typically composed of only a few satellites and the number of such systems notified represents only a small fraction of the number of notified non-GSO systems;

c) that under Nos. 11.44C.1, 11.44D.1, 11.49.2 and 11.49.3, the term "notified orbital plane" means an orbital plane of the non-GSO system, as provided to the Radiocommunication Bureau (Bureau) in the most recent notification information for the system's frequency assignments, that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4**;

d) that design considerations, availability of launch vehicles to support multiple satellite launches, the need to ensure safe flight operations between satellites in the same and other systems, and other factors can lead to notifying administrations needing to operate some space stations in orbital planes with some nominal variance from the notified orbital planes for the non-GSO systems referred to in *considering a)*;

e) that significant discrepancies between the operational orbital plane(s) of a non-GSO system and the notified orbital plane(s) for those systems as recorded in the Master International Frequency Register (Master Register) could negatively impact the efficient use of the orbit/spectrum resource in any frequency band used by non-GSO systems, including non-GSO systems not subject to this Resolution;

f) that minor discrepancies between the operational orbital plane(s) of a non-GSO system and the notified orbital plane(s) for those systems as recorded in the Master Register may not negatively impact the

efficient use of the orbit/spectrum resource in any frequency band used by non-GSO systems, including non-GSO systems not subject to this Resolution;

g) that the determination whether an orbital plane of a non-GSO system has characteristics that corresponds to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4** as provided to the Bureau in the most recent notification information for the system's frequency assignments is not always straightforward, and can depend on factors that are specific to the non-GSO system in question;

h) that it is important, for consideration of instances where a non-GSO system operates with orbital planes that are at variance with the system's notified orbital planes, that there is a mechanism developed for determining that such at-variance operation does not now and will not in the future result in the space stations of the non-GSO system causing more interference or claiming a higher need for protection than would have been the case if the operational orbital planes exactly matched the notified orbital planes for the system;

i) that for purposes of maximizing the efficient use of the orbit/spectrum resource for all non-GSO systems, whether or not they are in the same frequency band or service, it is important for there to be a listing maintained by the Bureau, and periodically updated by filing administrations, of all satellites in a subject non-GSO system that are operating in orbital planes that are at variance with Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4** of any of the system's notified orbital planes, as provided to the Bureau in the most recent notification information for the system's frequency assignments;

j) that notwithstanding *considerings g)*, *h)*, and *i)* above, there will be instances where the Bureau can determine without a methodology that an orbital plane of a non-geostationary-satellite system has characteristics that do not correspond to Items A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b4.i (only for orbits whose altitudes of the apogee and perigee are different) in Table A of Annex 2 to Appendix **4** as provided to the Bureau in the most recent notification information for the system's frequency assignments;

k) that, in addressing the subject of orbital tolerances, there is a need to seek a balance between the prevention of spectrum/orbit warehousing, providing accurate information regarding the operational orbital planes used by non-GSO systems to assist the proper functioning of coordination mechanisms, and the operational requirements related to the safe deployment and operation of a non-GSO system;

l) that satellites using highly-inclined orbits having an apogee altitude greater than 18 000 km and an orbital inclination between 35° and 145° have significant orbital precession rates and consequently, restrictive orbital keeping requirements, and correction of orbit parameters may lead to a reduction of such satellites' lifetime and to frequent replacement;

m) that adherence to a transparent approach to the question of orbital tolerances is desirable, as this reduces uncertainty with respect to the deployment of non-GSO systems,

recognizing

a) that the bringing into use of frequency assignments to non-GSO systems is addressed in Article 11;

b) that any regulatory mechanism for management of frequency assignments to non-GSO systems in the Master Register should not impose an unnecessary burden;

c) that the core characteristics of notified orbital planes in a non-GSO system are among the notified required characteristics as specified in Appendix **4** (specifically provision A.4.b.4.a, A.4.b.4.d, A.4.b.4.e and A.4.b.4.i);

d) that Resolution **35 (WRC-19)** addresses variances between the actual number of satellites in notified orbital planes and the notified number of satellites for each orbital plane, whereas this Resolution is addressing the subject of variances of deployed versus notified orbital characteristics ;

e) that No. 13.6 is applicable to non-GSO systems with frequency assignments in the frequency bands and services to which this Resolution applies;

f) that No. 11.49 addresses the suspension of recorded frequency assignments to a space station of a satellite network or to space stations of a non-GSO system,

recognizing further

that this Resolution relates to those aspects of non-GSO systems to which *resolves* 1 applies with regard to the notified required characteristics as specified in Appendix **4**, and the conformity of the notified required characteristics of the non-GSO systems, other than those referred to in *recognizing c)* above and Nos. 11.44C.1, 11.44D.1, 11.49.2 and 11.49.3 is outside the scope of this Resolution,

noting

that for the purpose of this Resolution:

– the term "frequency assignments" is understood to refer to frequency assignments to a space station of a non-GSO system;

– the term "notified orbital plane" means an orbital plane of the non-GSO system, as provided to the Bureau in the most recent notification information for the system's frequency assignments, that possesses the general characteristics of items:

- A.4.b.4.a, the angle of inclination of the orbital plane of the space station;
- A.4.b.4.d, the altitude of the apogee of the space station;
- A.4.b.4.e, the altitude of the perigee of the space station; and
- A.4.b.4.i, the argument of the perigee of the orbit of the space station (only for orbits whose altitudes of the apogee and perigee are different)

in Table A of Annex 2 to Appendix **4**;

resolves

1 that this Resolution applies to frequency assignments to non-GSO systems, other than non-GSO systems using the orbits described in *considering* b) above, in the frequency bands and for the services listed in the Table below:

TABLE

Frequency bands and services for application of the orbital tolerance approach

Frequency bands (GHz)	**Space radiocommunication services**		
	Region 1	**Region 2**	**Region 3**
10.70-11.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	
11.70-12.50	FIXED-SATELLITE (space-to-Earth)		
12.50-12.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	BROADCASTING-SATELLITE FIXED-SATELLITE (space-to-Earth)
12.70-12.75	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space)	BROADCASTING-SATELLITE FIXED-SATELLITE (space-to-Earth)
12.75-13.25	FIXED-SATELLITE (Earth-to-space)		
13.75-14.50	FIXED-SATELLITE (Earth-to-space)		
17.30-17.70	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	None	FIXED-SATELLITE (Earth-to-space)

Frequency bands (GHz)	Space radiocommunication services		
	Region 1	Region 2	Region 3
17.70-17.80	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)
17.80-18.10	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)		
18.10-19.30	FIXED-SATELLITE (space-to-Earth)		
19.30-19.60	FIXED-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space)		
19.60-19.70	FIXED-SATELLITE (space-to-Earth) (Earth-to-space)		
19.70-20.10	FIXED-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	FIXED-SATELLITE (space-to-Earth)
20.10-20.20	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)		
27.00-27.50		FIXED-SATELLITE (Earth-to-space)	
27.50-29.50	FIXED-SATELLITE (Earth-to-space)		
29.50-29.90	FIXED-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space)	FIXED-SATELLITE (Earth-to-space)
29.90-30.00	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space)		
37.50-38.00	FIXED-SATELLITE (space-to-Earth)		
38.00-39.50	FIXED-SATELLITE (space-to-Earth)		
39.50-40.50	FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)		
40.50-42.50	FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE		
47.20-50.20	FIXED-SATELLITE (Earth-to-space)		
50.40-51.40	FIXED-SATELLITE (Earth-to-space)		

2 that, for frequency assignments to which *resolves* 1 applies, and for which information concerning the bringing into use or bringing back into use of the frequency assignments is provided to the Bureau on or after 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution no later than 30 days after the end of the regulatory period specified in No. 11.44 or No. 11.49, as applicable, or 30 days after the end of the bringing/bringing back into use period in No. 11.44C or No. 11.49.2, as applicable, whichever comes later;

3 that, for frequency assignments to which *resolves* 1 applies, and that were brought into use or brought back into use prior to 1 January 2025, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution no later than 1 April 2025;

4 that, for frequency assignments to which *resolves* 1 applies, and that retain the remark to the Master Register entry that was added under *resolves* 5b) of Resolution **35 (WRC-19)**, the notifying administration shall communicate to the BR the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution at the same time the notifying administration communicates to the BR the required information under *resolves* 7 or 8, as applicable, from Resolution **35 (WRC-19)**;

5 that, for frequency assignments to which *resolves* 1 applies, the notifying administration shall communicate to the Bureau the required information regarding the system's deployed space stations in accordance with Annex 1 to this Resolution three years after the date of submission in accordance with *resolves* 2 or 3 above, or if applicable, three years after the date of submission of the information required under *resolves* 7c) or 8c) from Resolution **35 (WRC-19)** as required under *resolves* 4 of this Resolution, and continue doing so on the anniversary date of submission every three years thereafter;

6 that, upon receipt of the required deployment information submitted in accordance with *resolves* 2, 3, 4 or 5 above, BR shall promptly make this information available "as received" on the ITU website

7 that, if the information provided in any Annex 1 submission under *resolves* 2, 3, 4, or 5 above shows a change in the altitude of the apogee or perigee of the space station of more than [3%], or a change of more than 1 degree in the angle of inclination of the orbital plane of the space station from the notified orbital plane(s) provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments, the notifying administration shall also submit to the BR, no later than 90 days after the deadline for the Annex 1 submission under *resolves* 2, 3, 4, or 5 above, modifications to the characteristics of the notified or recorded frequency assignments reflecting the revised parameters;

8 that, upon receipt of the modifications to the characteristics of the notified or recorded frequency assignments as referred to in *resolves* 7:

a) the BR shall promptly make this information available "as received" on the ITU website;

b) the BR, for the purpose of No. **11.43B**, shall retain the original dates of entry of the frequency assignments in the Master Register if:

iii) BR reaches a favourable finding under No. **11.31**; and

iv) the modifications are limited to changes in the altitude of the apogee of the space station (Appendix **4** data item A.4.b.4.d), the altitude of the perigee of the space station (Appendix **4** data item A.4.b.4.e), and the angle of inclination of the orbital plane of the space station (Appendix **4** data item A.4.b.4.a), along with changes associated with not causing more interference or requiring more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available); and

iii) the notifying administration provides a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments (see Appendix **4** data item A.25.a);

c) the BR shall publish the information provided and its findings in the BR IFIC;

9 that the Bureau shall, no later than 45 days before any deadline for submission by a notifying administration under *resolves* 2, 3, 4, 5, or 6 send a reminder to the notifying administration to provide the information required;

10 that, if a notifying administration fails to communicate the information required under *resolves* 2, 3, 4, 5, or 6 as appropriate, the Bureau shall promptly send to the notifying administration a reminder asking the administration to provide the required information within 30 days from the date of this reminder from the BR;

11 that, if a notifying administration fails to provide information after the reminder sent under *resolves* 10, the Bureau shall send to the notifying administration a second reminder asking it to provide the required information within 15 days from the date of the second reminder;

12 that, if a notifying administration fails to provide the required information under *resolves* 2, 3, 4, 5, or 6, as appropriate, following the reminders under *resolves* 10 and 11, the Bureau shall:

a) inform the Radio Regulations Board (RRB), at the RRB's next scheduled meeting, that the Bureau intends to discontinue taking the entry in the Master Register into account when conducting its examinations;

b) in the absence of a determination by the RRB to reject or postpone the course of action outlined in *resolves* 12*a)* at the first RRB meeting after the Bureau provides the information in *resolves* 12*a)*, no longer consider the frequency assignments under subsequent examinations under Nos. 9.36, 11.32 or 11.32A, and inform administrations having frequency assignments subject to Sub-Section IA of Article 9 that those assignments shall not cause harmful interference to, nor claim protection from, other frequency assignments recorded in the Master Register with a favourable finding under No. 11.31;

13 that the suspension of the use of frequency assignments in accordance with No. 11.49 at any point prior to a reporting deadline as specified in *resolves* 2, 3, 4 or 5 of this Resolution, as applicable, shall not alter or reduce the requirements associated with any reporting obligations as stated in this Resolution;

14 that, if information provided by a notifying administration under *resolves* 4 of this Resolution results in any satellites not retaining their original dates of entry in the Master Register after application of *resolves* 8 of this Resolution, such satellites shall not be included in the total number of satellites deployed as part of the system during any relevant milestone period;

15 that nothing in this Resolution, including *resolves 6* above, shall be considered to limit or constrain the Bureau from implementing or following the procedure set forth in No. 13.6 of the Radio Regulations upon receipt of any Annex 1 submission under *resolves* 2, 3, 4 or 5 above, or at any other time, with respect to the bringing into use, bringing back into use, or continuation in use of frequency assignments to non-GSO space stations in accordance with the notified required characteristics of a notified orbital plane as specified in Appendix **4**,

instructs the Radiocommunication Bureau

1 to take the necessary actions to implement this Resolution;

2 to report any difficulties it encounters in the implementation of this Resolution to WRC-27,

invites the ITU-R

to continue studies with a view to identifying a methodology or methodologies for determining whether specific changes to a notified orbital plane will cause more interference or require more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments.

ANNEX 1 TO RESOLUTION [B7(A)] (WRC-23)

Information to be submitted about the deployed space stations

A Satellite system information

1) Name of the satellite system

2) Name of the notifying administration

3) Country symbol

4) Reference to the advance publication information or the request for coordination, or the notification information, if available

5) Total number of space stations deployed into each notified orbital plane of the satellite system with the capability of transmitting or receiving the frequency assignments

6) Orbital plane number indicated in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments into which each space station is deployed.

B Space station characteristics for each space station deployed

1) Name of the space station

2) Orbital plane number with which the space station is associated

3) Altitude of the apogee and perigee of the space station and angle of inclination of the orbital plane of the space station

4) For each space station operating in an orbital plane with an altitude of the apogee/perigee or angle of inclination at variance from the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available), a detailed explanation of why there is a change in the orbital characteristics of the space station and a technical showing to support a determination that the variance does not result in any increased interference or protection requirements as compared to those requirements for operation without the variance.

C Commitment of Non-Interference/Non-Protection

By providing a submission under Annex 1 to this Resolution, the notifying administration commits that the operation of its notified frequency assignments using the orbital characteristics of the submission that are at variance with the notified orbital plane(s) will not cause more interference or require more protection than the characteristics provided in the latest notification information published in the BR IFIC (Part II-S, if available, or Part I-S if Part II-S is not available) for the frequency assignments to the non-geostationary-satellite system.

Reasons: To provide a mechanism to ensure that deviations in key orbital parameters from what is notified and/or recorded in the MIFR are transparent, reasonably up to date, and cause no change in the interference environment in which the non-GSO system operates.

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MOD USA/7A/5

APPENDIX 4 (REV.WRC-19)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations[2] (Rev.WRC-12)

Footnotes to Tables A, B, C and D

Items in Appendix	*A - GENERAL CHARACTERISTICS OF THE SATELLITE NETWORK OR SYSTEM, EARTH STATION OR RADIO ASTRONOMY STATION*	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network or system subject to coordination under Section II	Advance publication of a non-geostationary-satellite network or system not subject to coordination under Section II	Notification or coordination of a geostationary-satellite network (including	Notification or coordination of a non-geostationary-satellite network or system	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
***												
A.23	**COMPLIANCE WITH RESOLUTION 35 (WRC-19)**										**A.23**	
A.23.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.23.a	
***												
A.25	**COMPLIANCE WITH RESOLUTION [B7(A)] (WRC-23)**										**A.25**	
A.25.a	a commitment stating that the characteristics as modified will not cause more interference or require more protection than the characteristics provided in the latest notification information published in Part I-S of the BR IFIC for the frequency assignments to the non-geostationary-satellite system					**O**					A.25.a	

Reasons: To improve and clarify the procedural implementation provisions for Method A4.

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 10

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,

Draft Proposal for a WRC-27 Agenda Item

Consideration of regulatory provisions for updating Appendix 26 of the Radio Regulations to support the modernization of aeronautical mobile (OR)

The High Frequency (HF) (3-30 MHz) range has been identified as an effective alternative to provide much needed integrated and interoperable Beyond-Line-of-Sight (BLOS) communications capabilities. HF is also a critical and affordable option for global broadcasting and amateur radio, and an alternative when other communications services are unavailable due to natural disasters or other national emergencies. Commercial financial institutions are exploring the use of HF long-distance delivery for financial users requiring low latency data. The challenge with meeting the growing requirements for current HF use is the need for increased bandwidth that would be required to achieve HF's advantages while not impeding the legacy frequency needs of incumbent users, groups or countries.

Modern wideband HF (WBHF) technologies are available that enable the flexibility to use wider channel bandwidths within advanced digital HF and enhanced applications that can support a shared environment while also maximizing spectrum efficiency. Current wideband constructs embrace technology and methodologies that automate the negotiating of the Radio Frequency (RF) environment while mitigating any harmful interference to users in, or adjacent to, a desired HF frequency range. WBHF technologies would be similarly beneficial for aeronautical use of HF.

Aeronautical use of the various HF frequency bands in the range 3025 to 18030 kHz is essential to long distance aeronautical communications in remote and oceanic areas. Since the last substantive review of RR Appendix **26** of the ITU Radio Regulations by WRC-15, use of HF by aviation has continued to change and grow. Aviation is evaluating future developments within the HF band, using new technology to significantly improve capacity, connectivity, and quality of service for aviation data and voice, including increased channel bandwidths for greater data throughput. Such developments within existing aviation HF allocations would provide aviation with additional capabilities, improving safety and global coverage. Appendix **26** of the ITU Radio Regulations limits Aeronautical Mobile (OR) to a maximum bandwidth of 2.8 kHz.Thus, RR Appendix **26** should be reviewed and revised to meet the current and future aeronautical requirements by allowing for bonding contiguous HF channels and digital

modulations that support higher data rates while ensuring that interference outside of the assigned multi-channel bands is no greater than the interference of individually utilized channels.

Proposal:

To review Appendix **26** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies, to accommodate wideband HF (WBHF) technologies in existing HF bands allocated to the aeronautical mobile (off route) service and ensure coexistence of current HF systems alongside WBHF systems, in accordance with Resolution [USA/10/WIDEBAND HF] (WRC-23).

ADD USA/XXXX/XX

DRAFT NEW RESOLUTION [USA-2027]

Agenda for the 2027 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2023),

considering

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

b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference 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 WRC-19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[XXX] to consider, on the basis of ITU-R studies in accordance with Resolution **[USA/10/ WIDEBAND HF] (WRC-23)**, appropriate regulatory actions, including possible updates to Appendix **26** of the Radio Regulations in support of aeronautical mobile (OR) Wideband HF modernization;

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-27, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-27,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To provide for studies, review and possible revision of RR Appendix **26** to meet current and future aeronautical requirements in light of availability of new technologies capable of modernizing HF including significant improvements to capacity, connectivity and quality of service.

ADD USA/XXXX/XX

DRAFT NEW RESOLUTION [USA/10/WIDEBAND HF] (WRC-23)

Consideration of regulatory provisions for updating Appendix 26 of the Radio Regulations in support of aeronautical mobile (OR) HF modernization

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that for the purpose of this Resolution, the term "wideband" in HF communications may refer to a combination of multiple 3 kHz channels to provide improved data rates;

b) that, with the availability of advanced digital technologies and the demonstrated capabilities of aeronautical wideband HF, including contiguous or non-contiguous channel aggregation, faster data rates and better voice communications are possible;

c) that digital aeronautical HF must coexist with existing aeronautical analogue voice and data HF systems

d) that desirable properties of HF propagation enable global coverage for aircraft;

e) that aeronautical analogue voice and narrowband digital HF systems are the primary means for international and domestic aviation to communicate with aircraft in remote and oceanic areas;

f) that there is an operational need for the modernization of data link services in the HF

band for messages related to the safety and regularity of flight for use by international civil aviation;

g) that current aeronautical HF systems are limited by the available technology, and are insufficient to meet many modern aircraft information requirements without being augmented by aeronautical safety satellite communications;

h) that use of the frequencies in the frequency bands allocated to the aeronautical mobile (OR) service (AM(OR)S) between 3025 and 18030 kHz is governed by the provisions of Appendix 26,

recognizing

a) the need for improving aeronautical HF performance in support of internationally recognized aviation performance standards as defined by the International Civil Aviation Organization (ICAO);

b) that Annex 10 (Volume III) to the Convention on International Civil Aviation is a part of the international Standards and Recommended Practices (SARPs) for the current aeronautical narrowband HF communication systems used by international civil aviation;

c) that the modernization of aeronautical HF communications will not require any changes to Article **5** of the Radio Regulations;

d) that the frequencies 3 023 kHz and 5 680 kHz are designated for search and rescue in Appendix **15** of the Radio Regulations;

e) that any channel aggregation needs to be performed in a manner that protects other primary services operating in band and in adjacent frequency bands,

noting

a) that a similar resolution, (Res 429 (WRC-19)), considered regulatory provisions for updating Appendix 27 of the Radio Regulations in support of HF modernization for aeronautical mobile (R);

b) that the existing regional frequency allotments are detailed in Appendix **26** for aeronautical HF in the AM(OR)S;

c) that Appendix **26** provides international and regional allotments for HF channels within the AM(OR)S;

d) that the current aeronautical HF narrowband digital communications are detailed in Recommendation ITU-R M.1458;

e) that inter-system compatibility among internationally standardized aeronautical equipment is the responsibility of ICAO;

f) that new HF contiguous or non-contiguous channel aggregation technology allows for variable bandwidths greater than 3 kHz,

resolves to invite the ITU Radiocommunication Sector

1 to identify any necessary modifications to Appendix **26** for the AM(OR)S between 3025 and 18030 kHz, noting recognizing c);

2 to identify any necessary transition arrangements for the introduction of new digital aeronautical wideband HF systems and any consequential changes to Appendix **26**;

3 to recommend how new digital aeronautical wideband HF systems can be introduced while ensuring compliance with safety requirements and with recognizing e);

4 to define the relevant technical and operational characteristics and to conduct any necessary sharing and compatibility studies with incumbent services that are allocated on a primary basis in the same or adjacent frequency bands to avoid harmful interference in accordance with recognizing e);

5 to complete the studies in time for WRC-27,

invites the 2027 World Radiocommunication Conference

to consider necessary changes to Appendix **26**, on the basis of the studies conducted under resolves 4 *to invite the ITU Radiocommunication Sector* above,

instructs the Secretary-General

to bring this Resolution to the attention of the ICAO,

invites the International Civil Aviation Organization

to participate actively by providing aeronautical operational requirements and relevant available technical characteristics to be taken into account in ITU Radiocommunication Sector studies.

Reasons: To provide a roadmap for studies and review for possible revision of RR Appendix **26** to meet current and future aeronautical requirements in light of availability of new technologies capable of modernizing HF including significant improvements to capacity, connectivity and quality of service.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM TO UPDATE ITU RADIO REGULATION APPENDIX 26 IN SUPPORT OF WIDEBAND HF

Subject: Proposed Future WRC Agenda Item for WRC-2027 to support updates to ITU Radio Regulations in support of Wideband HF

Origin: United States of America

Proposal: To review and update the relevant sections of ITU RR Appendix 26 in support of Wideband HF for aviation applications while ensuring compatibility with legacy HF uses.

Background/reason:

The aeronautical use of the various HF frequency bands in the range 3025 and 18030 kHz kHz is essential to long distance aeronautical communications in remote and oceanic areas. Since the last substantive review of RR Appendix 26 of the ITU Radio Regulations, use of HF by aviation has continued to change and grow. Aviation is evaluating future developments within the HF band, using new technology to significantly improve capacity, connectivity, and quality of service for aviation data and voice, including increased channel bandwidths for greater data throughput. Such developments within existing aviation HF allocations would provide aviation with additional capabilities, improving safety and global coverage. RR Appendix 26 needs to be reviewed to ensure it meets the current and future aeronautical requirements by allowing for bonding contiguous HF channels and allow digital modulations that support higher data rates while ensuring that interference outside of the assigned multi-channel bands is no greater than the interference of individually utilized channels.

Radiocommunication services concerned:

Aeronautical Mobile (OR)

Indication of possible difficulties: none foreseen

Previous/ongoing studies on the issue: N/A

Studies to be carried out by: ITU-R WP5B	*with the participation of:* ICAO

ITU-R Study Groups concerned: SG 5

ITU resource implications, including financial implications (refer to CV126): minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No

Number of countries:

Remarks

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