Annex 1

World Radiocommunication Conference 2023 ("WRC-23") Decisions

Agenda Item ("AI") 1.1

to consider, based on the results of the studies conducted by the Radiocommunication Sector of ITU ("ITU-R"), possible measures to address, in the frequency band 4800 – 4990 MHz ("4.9 GHz"), protection of stations of the aeronautical and maritime mobile services ("AMS/MMS stations") located in international airspace and waters from other stations located within national territories and to review the power flux-density ("pfd") criteria in No. ***5.441B*** *in accordance with Resolution* ***223 (Rev.WRC-19)*** [1]

Key Points

AI 1.1 covered the technical and regulatory conditions for the protection of AMS/MMS stations located in international airspace and waters from other stations (including International Mobile Telecommunications ("IMT") stations operating in the 4.9 GHz band [2]) located within administrations' territories.

WRC-23 Decision

WRC-23 decided to maintain the existing regulatory measures and technical conditions for the protection of AMS/MMS stations located in international airspace and waters by keeping a) the pfd criteria applied to a list of countries which have identified the 4.9 GHz band for IMT ("the List") set out in the Radio Regulations ("RR") No. **5.441B** and, b) the list of exempted countries, including China, from application of the pfd criteria in the revised ITU RR Resolution **223 (Rev.WRC-23)**. On the other hand, some countries have their name added to or removed from the List.

[1] Resolution **223 (Rev.WRC-19)**: Additional frequency bands identified for International Mobile Telecommunications

[2] The 4800 – 4990 MHz band is globally allocated to, among others, mobile service (including aeronautical and maritime mobile services) on a co-primary basis.

AI 1.2

*to consider identification of the frequency bands 3300 – 3400 MHz, 3600 – 3800 MHz, 6425 – 7025 MHz, 7025 – 7125 MHz and 10.0 – 10.5 GHz for IMT, including possible additional allocations to the mobile service ("MS") on a primary basis, in accordance with Resolution **245 (WRC-19)** [3]*

Key Points

AI 1.2 considered identification of the following bands for IMT including possible additional allocations to the MS on a primary basis globally or at regional level in accordance with Resolution **245 (WRC-19)**:

(a) 6.425 – 7.025 GHz ("6 GHz band") (Region 1, i.e. Europe and Africa);

(b) 7.025 – 7.125 GHz ("7 GHz band") (global); and

(c) 3.3 – 3.4 GHz[4], 3.6 – 3.8 GHz and 10.0 – 10.5 GHz (Region 2, i.e. America).

WRC-23 Decision

Frequency Band	Decision
6.425 – 7.025 GHz	WRC-23 identified the 6 GHz band in Region 1, as well as some countries in Region 2 and Region 3 (i.e. Asia and Oceania) [5] through new RR footnotes, for IMT with technical conditions for the protection of primary incumbent services, in particular fixed-satellite service ("FSS") (Earth-to-space) in the 6.425 – 7.075 GHz band, stipulated in a new Resolution covering the 6.425 – 7.125 GHz band. China is not in the country list of the relevant new RR footnote concerning identification of the 6 GHz band for IMT in Region 3.
7.025 – 7.125 GHz	WRC-23 identified the 7 GHz band in Region 1 and Region 3, as well as some countries in Region 2 for IMT through new RR footnotes with technical conditions for the protection of primary incumbent services, in particular FSS (Earth-to-space) in the 6.425 – 7.075 GHz band, stipulated in a new Resolution covering the 6.425 – 7.125 GHz band.

[3] Resolution **245 (WRC-19)**: Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3300 - 3400 MHz, 3600 - 3800 MHz, 6425 - 7025 MHz, 7025 - 7125 MHz and 10.0 - 10.5 GHz

[4] In addition to Region 2, identification for IMT use in the 3.3 – 3.4 GHz band is also proposed to be extended to administrations of Region 1 via amendment to the existing relevant footnotes.

[5] These countries are Brazil and Mexico in Region 2, and Cambodia, Lao and Maldives in Region 3.

Frequency Band	Decision
3.3 – 3.4 GHz	WRC-23 additionally allocated the 3.3 – 3.4 GHz band to MS except aeronautical mobile service ("AMS") on a primary basis and identified this band for IMT in some countries in Region 1 through revisions of the relevant RR footnotes. WRC-23 also upgraded the secondary allocation of this band to MS except AMS on a primary status and identified this band for IMT in Region 2.
3.6 – 3.8 GHz	WRC-23 identified the 3.6 – 3.7 GHz band for IMT in Region 2 and the 3.7 – 3.8 GHz band for IMT in some countries in Region 2 through a new RR footnote.
10.0 – 10.5 GHz	WRC-23 additionally allocated this band to MS on a primary basis and identified this band for IMT in some countries in Region 2 through revisions of the relevant RR footnotes and a new RR footnote with technical conditions for the protection of incumbent services in the same and adjacent bands stipulated in a new Resolution.

AI 1.3

*to consider primary allocation of the frequency band 3600 – 3800 MHz to the MS in Region 1 and take appropriate regulatory actions, in accordance with Resolution **246 (WRC-19)*** [6]

Key Points

AI 1.3 considered primary allocation of the 3600 – 3800 MHz band to MS in Region 1.

WRC-23 Decision

WRC-23 decided to allocate the 3600 – 3800 MHz band to MS except AMS on a primary basis in Region 1 subject to agreement between the neighbouring administrations obtained under RR Nos. **9.21, 9.17** and **9.18** if the relevant pfd limit of the concerned station is exceeded.

[6] Resolution **246 (WRC-19)**: Studies to consider possible allocation of the frequency band 3600 – 3800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1

AI 1.4

*to consider, in accordance with Resolution **247 (WRC-19)** [7], the use of high-altitude platform stations as IMT base stations ("HIBS") [8] in the MS in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level*

Key Points

AI 1.4 covered the use of HIBS in MS in six frequency bands below 2.7 GHz identified for IMT, on a global or regional level including the sharing and compatibility studies and modifications to the RR. The frequency bands were grouped into four issues as shown below:

- Issue A: 694 – 960 MHz;
- Issue B: 1710 – 1885 MHz;
- Issue C: 1885 – 1980 MHz, 2010 – 2025 MHz, 2110 – 2170 MHz; and
- Issue D: 2500 – 2690 MHz.

WRC-23 Decision

Frequency Band	Decision
694 – 960 MHz	WRC-23 identified the 694 – 960 MHz band in Region 1, the 698 – 960 MHz band in Region 2 and the 698 – 960 MHz, 703 – 733 MHz, 758 – 788 MHz, 890 – 915 MHz and 935 – 960 MHz bands in some countries in Region 3 including China for HIBS on the condition that HIBS shall not claim protection from incumbent primary services.
1710 – 1885 MHz, 1885 – 1980 MHz, 2010 – 2025 MHz, 2110 – 2170 MHz	WRC-23 identified the 1710 – 1980 MHz, 2010 – 2025 MHz and 2110 – 2170 MHz bands in Regions 1 and 3, and the 1710 – 1980 MHz and 2110 – 2160 MHz bands in Region 2 for HIBS on the condition that HIBS shall not claim protection from incumbent primary services.
2500 – 2690 MHz	WRC-23 identified the 2500 – 2690 MHz band in Regions 1 and 2, and the 2500 – 2655 MHz band in Region 3 for HIBS on the condition that HIBS shall not claim protection from incumbent primary service.

[7] Resolution **247 (WRC-19)**: Facilitating mobile connectivity in certain frequency bands below 2.7 GHz using high-altitude platform stations as International Mobile Telecommunications base stations

[8] HIBS are located in the stratosphere, providing both uplink and downlink mobile connectivity to the ground-based user equipment. HIBS are intended to be used as part of terrestrial IMT networks, as an application of the mobile service, and may use the same frequency bands with ground-based IMT base stations. The user equipment to be served by HIBS is proposed to be the same as that served by the ground-based IMT base stations. Currently, the user equipment supports a variety of frequency bands identified for IMT, including frequency bands below 2.7 GHz.

AI 1.5

*to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1 on the basis of the review in accordance with Resolution **235 (WRC-15)*** [9]

Key Points

AI 1.5 addressed the future use of the 470 – 694 MHz band in Region 1.

WRC-23 Decision

WRC-23 approved an additional allocation of the 470 – 694 MHz band, or parts thereof, to MS except AMS on a secondary basis for some countries in Region 1 subject to agreement obtained under RR No. **9.21** and a field strength requirement. Stations operating in the MS shall not cause harmful interference to, or claim protection from the existing and/or future broadcasting service, radio astronomy service and aeronautical radionavigation service as applicable in neighbouring countries. Accordingly, WRC-23 also decided to shorten the frequency range from 470 – 960 MHz to 470 – 694 MHz, among others, covered by the revised Resolution **235 (Rev.WRC-23)**.

[9] Resolution **235 (WRC-15)**: Review of the spectrum use of the frequency band 470 – 960 MHz in Region 1

AI 1.6

*to consider, in accordance with Resolution **772 (WRC-19)*** [10]*, regulatory provisions to facilitate radiocommunications for sub-orbital vehicles ("SOV")* [11]

Key Points

AI 1.6 covered the spectrum needs for stations on board SOV, appropriate modification (if any) to the RR, excluding any new allocations or changes to the existing allocations in **Article 5** of the RR, and to identify whether there is a need for access to additional spectrum.

WRC-23 Decision

WRC-23 decided that no change ("NOC") is made to the RR.

[10] Resolution **772 (WRC-19)**: Consideration of regulatory provisions to facilitate the introduction of sub-orbital vehicles

[11] SOV are intended to operate at higher altitudes than conventional aircraft during short periods of time without permanently entering an orbit.

AI 1.7

to consider a new aeronautical mobile-satellite (route) service ("AMS(R)S") allocation in accordance with Resolution ***428 (WRC-19)*** [12] *for both the Earth-to-space and space-to-Earth directions of aeronautical very high frequency ("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 aeronautical mobile (route) service ("AM(R)S"), in the aeronautical radionavigation service, and in adjacent frequency bands;*

Key Points

AI 1.7 dealt with a possible new allocation to the AMS(R)S within the 117.975 – 137 MHz band, to relay standard VHF communications operating under the AM(R)S using standard VHF radios already installed on board aircraft with a view to complementing terrestrial infrastructures over oceanic and remote areas.

WRC-23 Decision

WRC-23 decided to allocate the 117.975 – 137 MHz band to AMS(R)S on a co-primary basis with AM(R)S where the use by AM(R)S shall have priority over the use by AMS(R)S. The use of AMS(R)S is limited to non-geostationary orbit ("NGSO") satellite systems in compliance with relevant international aeronautical standards and shall be subject to coordination under RR No. **9.11A**. In addition, WRC-23 adopted a new Resolution setting out, among others, the requirements for use of AMS(R)S in accordance with the frequency assignment planning procedures established by the International Civil Aviation Organization.

[12] 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

AI 1.8

*to consider, on the basis of ITU R studies in accordance with Resolution **171 (WRC-19)** [13], appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution **155 (Rev.WRC-19)** [14] and No. **5.484B** to accommodate the use of FSS networks by control and non-payload communications ("CNPC") of unmanned aircraft systems ("UAS")*

Key Points

AI 1.8 proposed a review and potential revision of Resolution **155 (Rev.WRC-19)** and RR footnote No. **5.484B** in order to accommodate the use of FSS networks by CNPC of UAS.

WRC-23 Decision

WRC-23 decided that NOC is made to the RR and any further action on Resolution **155 (Rev.WRC-19)** shall be suspended until decided by a WRC in future.

[13] Resolution **171 (WRC-19)**: Review and possible revision of Resolution **155 (Rev.WRC-19)** and No. 5.484B in the frequency bands to which they apply

[14] Resolution **155 (Rev. WRC-19)**: Regulatory provisions related to earth stations on board unmanned aircraft which operate with geostationary-satellite networks in the fixed-satellite service in certain frequency bands not subject to a Plan of Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces

AI 1.9

*to review Appendix **27** of the RR 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 high frequency ("HF") bands allocated to the AM(R)S and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution **429 (WRC-19)*** [15]

Key Points

AI 1.9 reviewed the "Frequency Allotment Plan for the Aeronautical Mobile (Route) Service and Related Information" (i.e. Appendix **27** of the RR) and considered appropriate regulatory actions and updates based on ITU-R's studies in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the AM(R)S and ensure coexistence of current HF systems alongside modernized HF systems.

WRC-23 Decision

WRC-23 approved updates in relevant parts of Appendix **27** of the RR on parameters related to classes of emission and maximum peak envelope powers associated with the modernised digital technologies to be deployed in the existing HF bands allocated to AM(R)S.

[15] Resolution **429 (WRC-19)**: Consideration of regulatory provisions for updating Appendix 27 of the Radio Regulations in support of aeronautical HF modernization

AI 1.10

*to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the AMS for the use of non-safety aeronautical mobile applications, in accordance with Resolution **430 (WRC-19)*** [16]

Key Points

AI 1.10 explored possible new allocations to AMS for non-safety applications, in the 15.4 – 15.7 GHz and 22.0 – 22.21 GHz bands.

WRC-23 Decision

WRC-23 decided to allocate the 15.41 – 15.7 GHz band to aeronautical mobile (off-route) service ("AM(OR)S") [17] limited to non-safety applications in Region 1 and a country in Region 3 (viz. Indonesia) on a secondary basis on the condition that AM(OR)S stations operating in the 15.41 – 15.7 GHz band shall not cause harmful interference to the radio astronomy service operating in the 15.35 – 15.4 GHz band.

WRC-23 also decided to allocate the 22.0 – 22.21 GHz band to AM(OR)S limited to non-safety applications in Region 1 and some countries in Region 3 [18] on a co-primary basis on the condition that the protection of the incumbent services in the same and adjacent bands shall be ensured.

[16] Resolution **430 (WRC-19)**: Studies on frequency-related matters, including possible additional allocations, for the possible introduction of new non-safety aeronautical mobile applications

[17] AM(OR)S is intended for communications primarily outside national or international civil air routes, which is for non-safety applications in the 15.4 – 15.7 GHz and 22.0 – 22.21 GHz bands.

[18] China is not in the country list of Region 3 in this regard.

AI 1.11

to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System ("GMDSS") and the implementation of e-navigation, in accordance with Resolution ***361 (Rev.WRC-19)*** [19]

Key Points

AI 1.11 considered possible regulatory actions to support the modernisation of GMDSS and implementation of e-navigation. Three issues were identified and resolved separately under this AI, namely:

- Issue A – modernization of GMDSS;
- Issue B – e-navigation [20]; and
- Issue C – introduction of additional satellite systems into the GMDSS.

WRC-23 Decision

Issue A

WRC-23 decided to support the modernization of the GMDSS by approving a number of updates to provisions and Resolutions in the RR in relation to maritime distress and safety. The updates include the introduction of modern communication systems in the GMDSS (such as automatic connection system and NAVDAT [21] system) and the removal of technologies not in practical use, i.e. the narrow band direct printing telegraphy. A new Resolution was adopted by WRC-23 for coordination of the use of frequencies in the 500 kHz and/or 4226 kHz band, and other frequency bands for NAVDAT system in accordance with the procedures established by the International Maritime Organization ("IMO").

Issue B

Issue B considered possible regulatory actions in support of e-navigation developed by the IMO. It was concluded in the second session of the Conference Preparatory Meeting for WRC-23 held in April 2023 that, from the spectrum regulatory point of view, the

[19] 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

[20] E-navigation refers to, as specified by IMO, the harmonised 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. (see https://www.imo.org/en/OurWork/Safety/Pages/eNavigation.aspx)

[21] NAVDAT (Navigational Data) is a digital system operating in MF/HF maritime bands for broadcasting of maritime safety and security information. (see: https://www.itu.int/en/ITU-R/seminars/wrs/2020/Plenary%20Sessions%20%20Presentations/03.%20Terrestrial%20Services%20-%201%20to%203%20Dec%202020/WRS20%20Modern%20Maritime%20Communications.pdf)

requirements for e-navigation were already covered in the RR. Consequently, WRC-23 decided that NOC is made to the RR.

Issue C

WRC-23 decided to reflect the use of the 1614.4225 – 1618.725 MHz or 1616.3 – 1620.38 MHz (Earth-to-space) and 2483.59 – 2499.91 MHz (space-to-Earth) bands by additional geostationary ("GSO") mobile-satellite service ("MSS") systems for GMDSS through the approval of a number of updates under the relevant provisions of the RR subject to the conditions set out in a new Resolution. The new Resolution specifies that these provisions shall enter into force only after an additional GSO MSS system can, among others, successfully complete the frequency coordination with the relevant NGSO MSS systems in accordance with Articles **9** and **11** of the RR prior to the commencement of GMDSS services.

AI 1.12

to conduct, and complete in time for WRC-23, studies for a possible new secondary allocation to the Earth exploration-satellite service ("EESS") (active) 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)*** [22]

Key Points

AI 1.12 explored a new secondary allocation to the EESS (active) for spaceborne radar sounders, which provide unique information on the physical properties of the Earth, within the range of frequencies around 45 MHz.

WRC-23 Decision

WRC-23 approved a new secondary allocation of the 40 – 50 MHz band to EESS (active) globally, which is limited to the use by spaceborne radar sounders as described in ITU-R Recommendation RS.2042, with a new resolution setting out the regulatory and technical provisions including geographical restrictions for the use of the systems concerned.

[22] 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

AI 1.13

*to consider a possible upgrade of the allocation of the frequency band 14.8 – 15.35 GHz to the space research service ("SRS"), in accordance with Resolution **661 (WRC-19)*** [23]

Key Points

AI 1.13 considered the possibility of upgrading the secondary allocation to SRS in the 14.8 – 15.35 GHz band to primary allocation.

WRC-23 Decision

WRC-23 approved the upgrade of the allocation of the 14.8 – 15.35 GHz band to SRS on a primary basis globally except in some countries listed in a new RR footnote. The primary allocation of the 14.8 – 15.35 GHz band to SRS is limited to the use by satellite systems operating at a distance within 2×10^6 km from the Earth while other use of SRS in this band would remain on a secondary basis. WRC-23 also adopted a new resolution, which sets out the regulatory and technical provisions for the use of the applicable SRS systems.

[23] 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

AI 1.14

to review and consider possible adjustments of the existing or possible new primary frequency allocations to the 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)*** [24]

Key Points

AI 1.14 considered possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the 231.5 – 252 GHz band, to ensure alignment with more up-to-date remote-sensing observation requirements.

WRC-23 Decision

WRC-23 decided to allocate the 239.2 - 242.2 GHz and 244.2 – 247.2 GHz bands to EESS (passive) on a primary basis globally. In exchange for the removal of the primary allocation to FS and MS in the 239.2 - 241 GHz band, WRC-23 decided to allocate the 235 – 238 GHz band to FS and MS on a primary basis, and the operation of EESS (passive) in the 235 – 238 GHz band shall not claim protection from stations of FS and MS.

[24] 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

AI 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 FSS globally, in accordance with Resolution **172 (WRC-19)*** [25]

Key Points

AI 1.15 dealt with harmonising the use of the 12.75 – 13.25 GHz band by earth stations on board aircraft and vessels communicating with geostationary space stations in the FSS (Earth-to-space) globally. In the World Radiocommunication Conferences held in 2015 and 2019 ("WRC-15" and "WRC-19"), the 19.7 – 20.2 GHz and 29.5 – 30.0 GHz bands, as well as the 17.7 – 19.7 GHz and 27.5 – 29.5 GHz bands have been adopted in Resolution **156 (WRC-15)** and Resolution **169 (WRC-19)** respectively allowing the use of Earth Stations in Motion ("ESIM") communicating with GSO FSS networks.

WRC-23 Decision

WRC-23 approved a new RR footnote concerning the operation of aeronautical and maritime ESIM ("A/M-ESIM") with GSO FSS stations in the 12.75 – 13.25 GHz (Earth-to-space) band globally subject to the provisions set out in a new Resolution, which covers, among others, the regulatory and interference management mechanisms for A/M-ESIM to follow for the protection of the incumbent services in the same and adjacent bands.

[25] Resolution **172 (WRC-19)**: Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite services in the frequency band 12.75 – 13.25 GHz (Earth-to-space)

AI 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, 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 NGSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution ***173 (WRC-19)*** [26]

Key Points

AI 1.16 considered the use of the 17.7 – 18.6 GHz, 18.8 – 19.3 GHz and 19.7 – 20.2 GHz bands by NGSO FSS (space-to-Earth) ESIM, and the 27.5 – 29.1 GHz and 29.5 – 30 GHz bands by NGSO FSS (Earth-to-space) ESIM globally. Studies had been conducted on the sharing and compatibility between A/M-ESIMs and terrestrial services as well as space services allocated in the aforementioned frequency bands.

WRC-23 Decision

WRC-23 approved a new RR footnote concerning the operation of A/M-ESIM with NGSO FSS stations in the 17.7 – 18.6 GHz, 18.8 – 19.3 GHz and 19.7 – 20.2 GHz (space-to-Earth) and 27.5 - 29.1 and 29.5 – 30 GHz (Earth-to-space) bands globally subject to the provisions set out in a new Resolution. The new Resolution sets out, among others, the regulatory measures and interference management mechanisms for NGSO FSS A/M-ESIM to follow for the protection of space and terrestrial services operating in the same bands, including the designated power emission limits under different conditions. The new Resolution also specifies that the operation of ESIM with NGSO stations shall not claim protection from and cause unacceptable interference to terrestrial services, and shall not claim more protection from or cause more interference to the space services than what is applicable to typical earth stations of the same NGSO FSS system.

[26] 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 NGSO space stations in the fixed-satellite service

AI 1.17

*to determine and carry out, on the basis of ITU-R studies in accordance with Resolution **773 (WRC-19)** [27], the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service ("ISS") allocation where appropriate*

Key Points

AI 1.17 covered the appropriate regulatory actions for the provision of inter-satellite links in the 11.7 – 12.7 GHz, 18.1 – 18.6 GHz, 18.8 – 20.2 GHz and 27.5 – 30 GHz bands, or portions of them, by adding an allocation to ISS where appropriate.

WRC-23 Decision

WRC-23 approved the allocation of the 18.1 – 18.6 GHz, 18.8 – 20.2 GHz and 27.5 – 30 GHz bands to ISS on a primary basis globally and limited the use of ISS in these bands to space research, space operation and/or Earth exploration-satellite applications, as well as transmission of data originating from space industrial and medical activities only. Relevant regulatory and technical provisions were also added to and revised in the RR.

[27] 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

AI 1.18

*to consider studies relating to spectrum needs and potential new allocations to the MSS for future development of narrowband mobile-satellite systems, in accordance with Resolution **248 (WRC-19)*** [28]

Key Points

AI 1.18 considered spectrum needs and potential new allocations to MSS in the 1695 – 1710 MHz, 3300 – 3315 MHz and 3385 – 3400 MHz bands in Region 2, and the 2010 – 2025 MHz band in Region 1 for future development of narrowband mobile-satellite systems.

WRC-23 Decision

WRC-23 decided that NOC is made to the RR.

[28] Resolution **248 (WRC-19)**: Studies relating to spectrum needs and potential new allocations to the mobile-satellite service in the frequency bands 1695 – 1710 MHz, 2010 – 2025 MHz, 3300 – 3315 MHz and 3385 – 3400 MHz for future development of narrowband mobile-satellite systems

AI 1.19

*to consider a new primary allocation to the FSS in the space-to-Earth direction in the frequency band 17.3 – 17.7 GHz in Region 2, while protecting existing primary services in the band, in accordance with Resolution **174 (WRC-19)*** [29]

Key Points

AI 1.19 considered a new primary allocation to FSS (space-to-Earth) in the 17.3 – 17.7 GHz band in Region 2, while protecting existing primary services in the band.

WRC-23 Decision

WRC-23 decided to allocate the 17.3 – 17.7 GHz band to FSS (space-to-Earth) in Region 2 on a co-primary basis and stipulate pfd limits under different conditions by additions and revisions of the relevant RR footnotes. The use of GSO FSS (space-to-Earth) stations in Region 2 shall not cause harmful interference to space station receivers nor claim protection from the broadcasting-satellite service ("BSS") feeder-link earth stations operating under Appendix **30A** in all three Regions.

[29] Resolution **174 (WRC-19)**: Primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3 – 17.7 GHz in Region 2

AI 7

to consider possible changes, and other options, 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)*** [30]*, in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit*

This AI covered 11 Topics, namely Topics A, B, C, D, E, F, G, H, I, J and K.

Topic A – Tolerances for certain orbital characteristics of NGSO space stations of the FSS, BSS or MSS

Key Points

Topic A considered the adoption of possible tolerances for certain orbital characteristics of NGSO space stations of the FSS, MSS or BSS to account for potential differences between values recorded in the Master International Frequency Register ("MIFR") for the specified orbital characteristics of NGSO space stations operating on notified frequency assignments and those representative of the actual deployment of these NGSO space stations.

WRC-23 Decision

WRC-23 approved a new Resolution which stipulates the tolerances for certain orbital characteristics of space stations deployed as part of NGSO systems in the FSS, BSS or MSS. Information about the deployed space stations to be submitted to the Radiocommunication Bureau ("BR") is defined in Annex 1 to the new Resolution.

Topic B – NGSO bringing into use post-milestone procedure

Key Points

Topic B considered the possible adoption of a procedure applicable to cases where a NGSO system subject to the milestone procedure in Resolution **35** (**WRC-19**) [31] has completed the milestone procedure, but subsequently experiences a sustained reduction in the number of

[30] Resolution **86 (WRC-07)**: Implementation of Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference

[31] Resolution **35 (WRC-19)**: A milestone-based approach for the implementation of frequency assignments to space stations in a NGSO satellite system in specific frequency bands and services

space stations deployed and capable of transmitting/receiving the assigned frequencies. When developing a post-milestone procedure, some degree of operational flexibility, including temporary operations, which is necessary for the maintenance of the NGSO system in the FSS, BSS and MSS, needs to be duly considered.

WRC-23 Decision

WRC-23 adopted a post-milestone procedure by further developing Resolution **35** (**WRC-19**) to permit some operational flexibility in the maintenance of the NGSO system while keeping reasonable alignment over time between the number of capable NGSO system satellites deployed for a system, and the number notified in the MIFR. Regarding the required threshold for decreases in the number of deployed satellites capable of transmitting/receiving the recorded frequency assignments to apply Resolution **35** (**WRC-19**), thresholds of different number depending on the number of satellites in the NGSO system are adopted.

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 NGSO systems operating in the same frequency bands and identical directions

Key Points

Topic C considered the effectiveness of the existing regulatory protection of the GSO MSS from interference caused by NGSO systems, and any possible inconsistencies in the provisions of the RR applicable to the frequency bands listed as follows ("Concerned Bands"):

- 7250 – 7750 MHz (space-to-Earth);
- 7900 – 8025 MHz (Earth-to-space);
- 20.2 – 21.2 GHz (space-to-Earth); and
- 30 – 31 GHz (Earth-to-space).

WRC-23 Decision

WRC-23 approved the addition and modification of relevant footnotes under Article 5 of the RR, requiring that NGSO systems operating in the Concerned Bands shall not cause unacceptable interference to and shall not claim protection from GSO networks in the MSS operating in accordance with the RR.

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

Key Points

Topic D consisted of three topics, namely Topics D1, D2 and D3, which were viewed as being straightforward and for which consensus was achieved within ITU-R when presented. Topic D1 considered the discrepancy between section 2 of Appendix 1 to Annex 4 of RR Appendix **30B** and the values of orbital separation with those in sections 1.1 and 1.2 of the Annex. Topic D2 addressed modification of RR Appendix **4** data items to support implementation of agreed revisions to Recommendation ITU-R S.1503-3. Topic D3 addressed 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** section 5.2.10 (20*bis* and 24*bis*) and RR Appendix **30B** section 8.17.

WRC-23 Decision

WRC-23 decided to modify section 2 of Appendix 1 to Annex 4 of RR Appendix **30B** to reflect the values of the minimum orbital separation as adopted in sections 1.1 and 1.2 of the Annex and modify RR Appendix **4**, including new data elements and modified data items. WRC-23 also decided to add relevant footnotes to RR Nos. **11.44B**, **11.44C**, **11.49** (**11.49.1** and **11.49.2**), RR Appendices **30**/**30A** section 5.2.10 (20*bis* and 24*bis*) and RR Appendix **30B** section 8.17 providing a formal reminder of the deadline for informing the BR of completion of bringing into use (or bringing back into use) of a satellite network or system.

Topic E – RR Appendix 30B improved procedures for new Member States

Key Points

Topic E considered any possible improvement to the procedure set out in Article 7 of Appendix **30B of the RR** for a new ITU Member State to obtain a national allotment like other ITU Member States that already have national allotment in the FSS Plan.

WRC-23 Decision

WRC-23 approved the modification and addition of the relevant provisions under Articles 6, 7 and 10 of Appendix **30B** of the RR, followed by adoption of a new Annex 7 to Appendix **30B of the RR**, with a view to better facilitating new ITU Member State to obtain a national allotment in the FSS Plan by providing additional guidance to the BR and the new ITU Member State.

Topic F – Excluding uplink service area in RR Appendix 30A for Regions 1 and 3 and RR Appendix 30B

Key Points

Topic F considered mechanisms to prevent one administration from creating an obstacle to the establishment of space systems by other administrations in the feeder link in RR Appendix **30A** or uplink in RR Appendix **30B**, in compliance with the Resolution **2** (**Rev.WRC-03**) [32] regarding the registration with the BR of frequency assignments for space radiocommunication services and their use do not provide any permanent priority for any individual country or groups of countries and do not create an obstacle to the establishment of space systems by other countries.

WRC-23 Decision

WRC-23 decided to add a new provision to Article 4 of Appendix **30A of the RR** to allow an administration to request at any time the exclusion of its territory from the feeder-link service area of a satellite network of other administrations. In addition, WRC-23 decided to add relevant provisions under Articles 4 and 6 of Appendices **30A** and **30B** of the RR respectively to adopt measures to avoid networks with uplink coverage area extending beyond the service area to seek protection because of this enlarged coverage area.

Topic G – Revisions to Resolution 770 (WRC-19) to allow its implementation

Key Points

Topic G considered possible revisions to Resolution **770** (**WRC-19**) [33] ("**Res. 770**") which provides a methodology to determine conformity of NGSO satellite systems with single-entry interference thresholds in Article 22 of the RR to ensure the protection of GSO FSS and BSS in the 37.5 – 39.5 GHz, 39.5 – 42.5 GHz, 47.2 – 50.2 GHz and 50.4 – 51.4 GHz bands.

WRC-23 Decision

[32] Resolution **2 (Rev.WRC-03)**: Equitable use, by all countries, with equal rights, of the geostationary-satellite and other satellite orbits and of frequency bands for space radiocommunication services

[33] Resolution **770 (WRC-19)**: Application of Article 22 of the Radio Regulations to the protection of geostationary fixed-satellite service and broadcasting-satellite service networks from NGSO fixed-satellite service systems in the frequency bands 37.5 – 39.5 GHz, 39.5 – 42.5 GHz, 47.2 – 50.2 GHz and 50.4 – 51.4 GHz

WRC-23 decided to remove Annex 2 from **Res. 770** and move it to ITU-R Recommendation S.2157-0, which would be incorporated by reference in a revision of **Res. 770**.

Topic H – Enhanced protection of RR Appendices 30/30A in Regions 1 and 3 and RR Appendix 30B

Key Points

Topic H reviewed the possible removal of the provisions associated with implicit agreement in Regions 1 and 3 RR Appendices **30/30A** and RR Appendix **30B**, where appropriate. This topic also considered possible application of a degradation tolerance of 0.25 dB in terms of equivalent protection margin ("EPM") degradation for assignments in the Regions 1 and 3 Plan set out in the RR Appendices **30/30A**.

WRC-23 Decision

WRC-23 decided to modify Article 4 of RR Appendices **30** and **30A** and Article 6 of RR Appendix **30B** with a view to the removal of the provisions associated with implicit agreement in these Appendices and enhanced protection of the BSS and FSS Plans.

Topic I – Special agreements under RR Appendix 30B

Key Points

Topic I considered possible methods to restore adequate overall aggregate carrier-to-interference levels without changing the orbital position for national allotments currently possessing low overall aggregate carrier-to-interference levels resulting from the application of section 6.15 of RR Appendix **30B**.

WRC-23 Decision

WRC-23 decided to define a new type of agreement between notifying administrations of a national allotment and of an assignment, respectively. Under such an agreement, the administration of the national allotment allows the assignment to operate until its assignment stemming from the national allotment put into use, at which time the administration of the assignment commits to respect the power-flux-density ("pfd") levels over the territory of the national allotment set out in section 2.2 of Annex 4 of RR Appendix **30B**. WRC-23 also approved a new Resolution which outlines a special procedure as a temporary regulatory measures in Appendix 30B to improve the reference situation of severely impact national allotments.

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

Key Points

Resolution **76** (**Rev.WRC-15**) [34] ("**Res. 76**") calls for the development of Recommendations on procedures and collaboration among administrations to ensure that the aggregate equivalent power-flux-density ("epfd") limits are not exceeded. However, there is no clear methodology nor procedures outlined in **Res. 76** for the administrations involved to collaboratively determine whether those aggregate epfd limits are exceeded. Topic J aimed to address a part of this deficiency by developing or calling for the development of a consultation process to be applied to the operators of NGSO FSS systems to avoid, and potentially remedy any exceedance of the aggregate epfd limits specified in **Res. 76** based on accurate modelling of NGSO systems.

WRC-23 Decision

WRC-23 decided to modify **Res. 76** to incorporate the concept of consultation meetings between administrations operating or planning to operate NGSO FSS systems. These meetings would provide administrations with a forum and a framework to discuss and agree cooperatively on sharing the aggregate epfd in a manner to achieve the level of protection for GSO satellite networks. Details of the meeting, including decisions, would be sent to the BR.

Topic K – Modification to Resolution 553 (Rev.WRC-15) to remove certain restrictions that prevent administrations from taking effective advantage of the Resolution

Key Points

Topic K considered to remove certain restrictions in Resolution **553** (**Rev.WRC-15**) [35] ("**Res. 553**"), which make **Res. 553** applicable only once by an administration regardless of whether that administration has succeeded in notifying the intended network and prevent an administration to apply **Res. 553** if it has even one pending request under the normal procedure of coordination in the relevant frequency band.

[34] Resolution **76 (Rev.WRC-15)**: Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple NGSO fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

[35] Resolution **553 (Rev.WRC-15)**: Additional regulatory measures for broadcasting-satellite networks in the frequency band and 21.4 – 22 GHz in Regions 1 and 3 for the enhancement of equitable access to this frequency band

WRC-23 Decision

WRC-23 decided to modify paragraphs 1 and 2 of the Attachment to **Res. 553** to remove the intended restrictions in the WRC Resolution.

- END -