International Regulatory Mechanisms

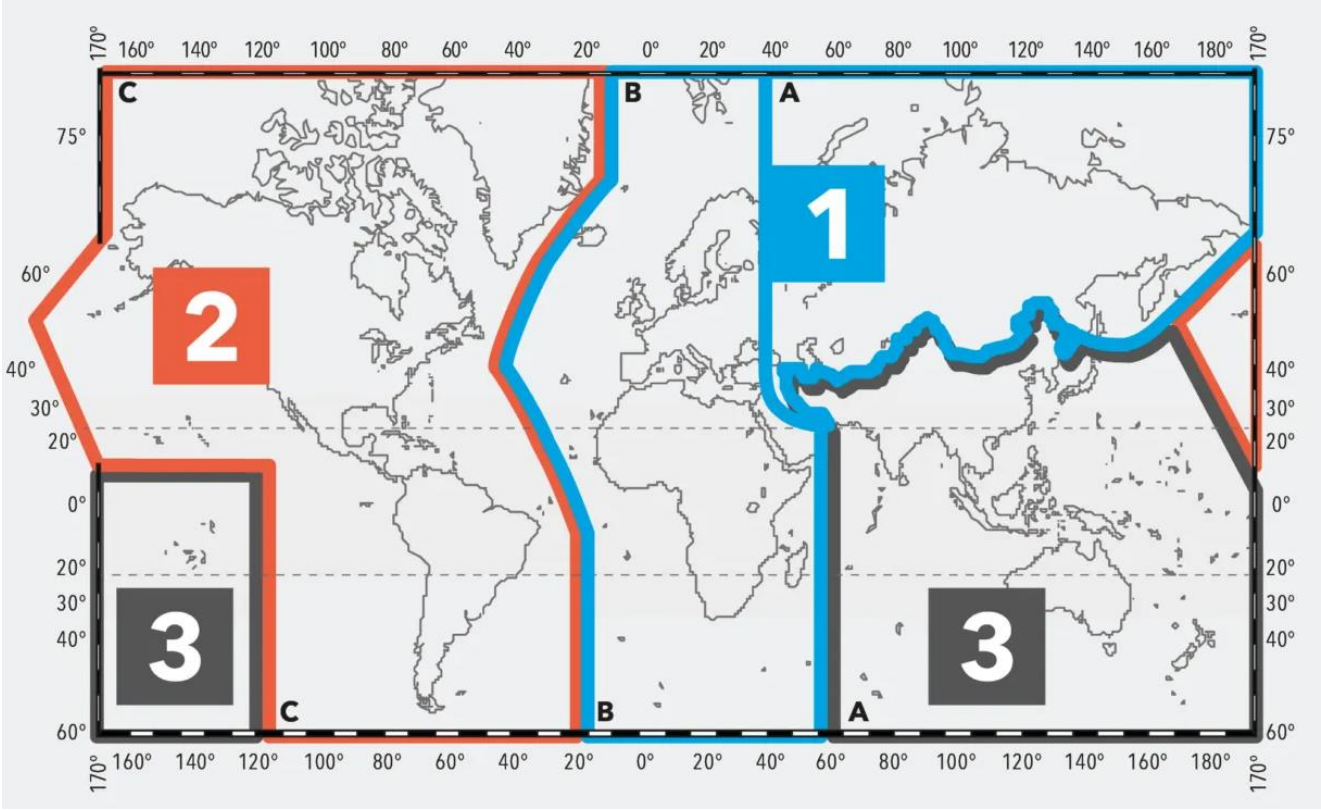
Digital Outlook Series 2024
Cyberjaya Malaysia

Oct 2024

Scope

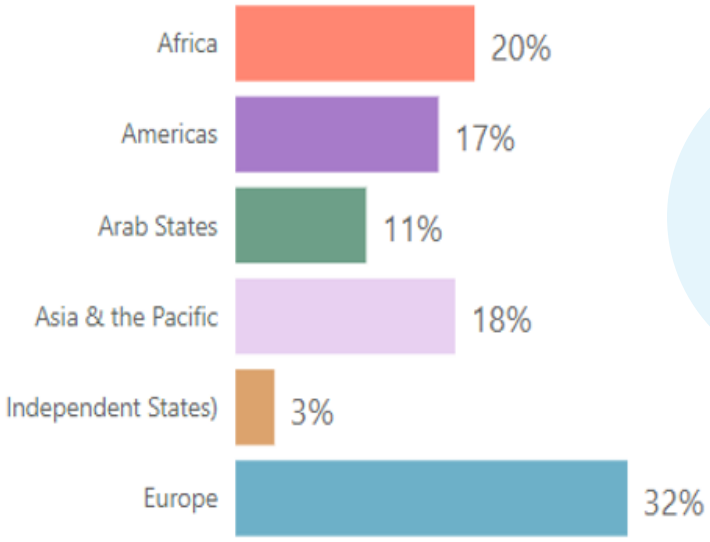
WRC-23 decision and WRC-27 AI to

National regulations: Some insights



WRC-23 in numbers

3987
Delegates



163
Member States

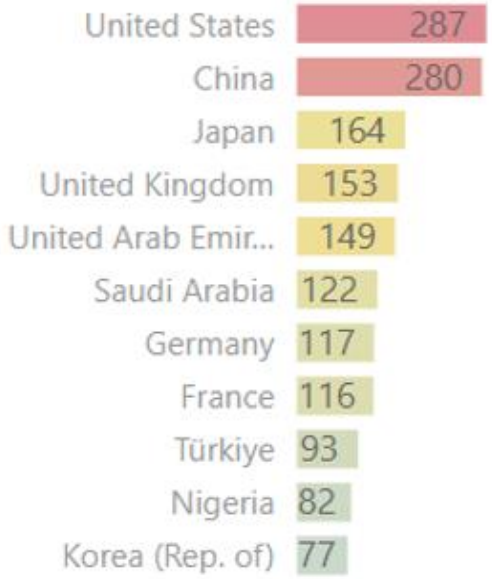
151
observers

ITUWRC
DUBAI2023

967
Docs.

6 024
proposals

4
weeks



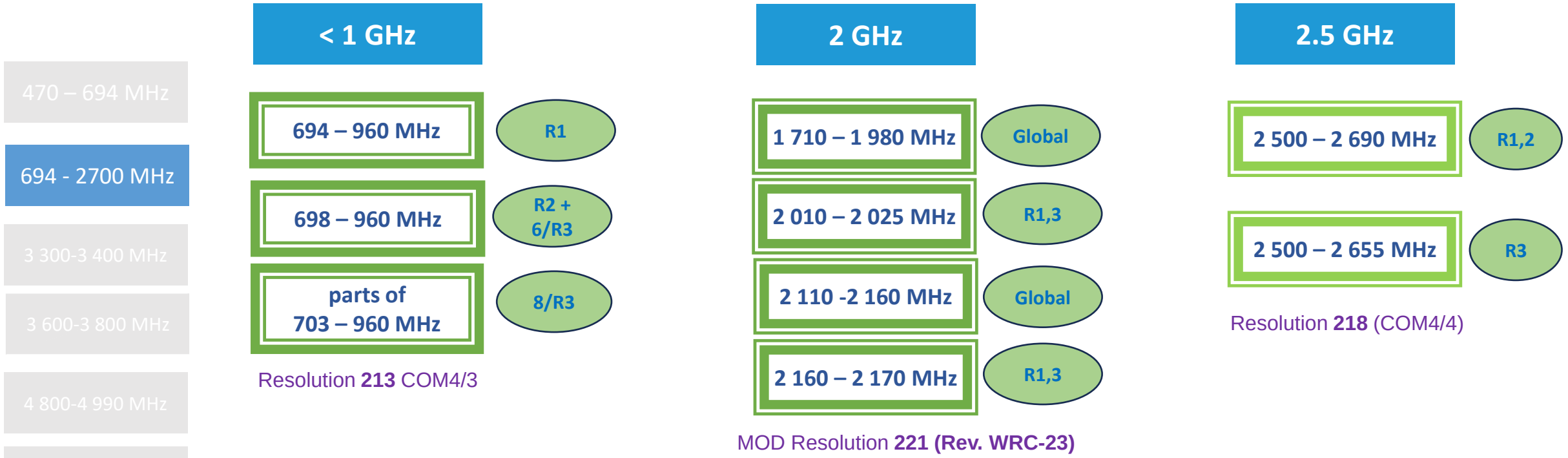
WRC-23 – fixed, mobile, broadcasting

Fixed, Mobile and Broadcasting issues

(agenda items 1.1, 1.2, 1.3, 1.4 and 1.5)

Agenda item 1.4 – High-altitude platform stations as IMT base stations (HIBS)

WRC-23 identified for HIBS the following bands:



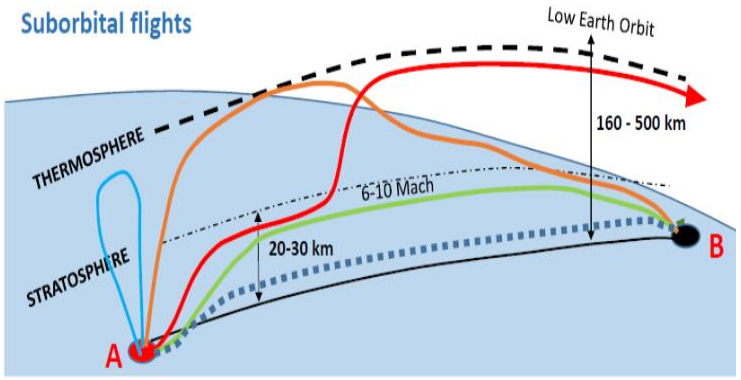
Implications: HIBS – a new platform to provide mobile broadband with minimal infrastructure using the same frequencies and devices as IMT networks. Extending IMT coverage in remote and rural areas. Maintaining connectivity in case of natural disasters

Aeronautical and maritime issues

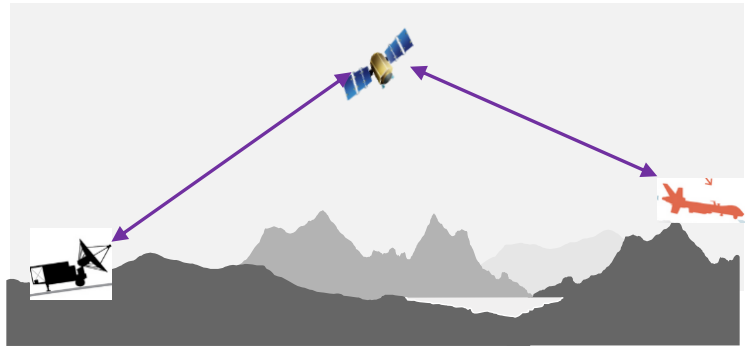
(agenda items 1.6, 1.7, 1.8, 1.9, 1.10 and 1.11)

Agenda item 1.6 and 1.8

- **AI 1.6 Suborbital flights**
  - **NOC** under this agenda item
  - WRC-23 could not reach agreement on any regulations for suborbital flights

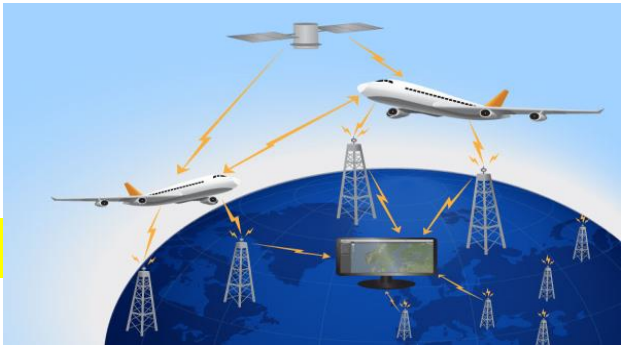


- **AI 1.8 -** FSS for Unmanned Aircraft Systems
  - **No decision** for using fixed-satellite service for UAS command and control (CNPC) under Res. 155 (Rev.WRC-19)
  - WRC-23 suspended any further action on Res. 155, instructed to study AMS(R)S for command and control of UAS



Agenda item 1.7 and 1.9

- **AI 1.7** VHF satellite communications with aircraft
  - **allocation** 117.975 – 137 MHz to aeronautical mobile-satellite (R) service. Protection of terrestrial VHF links, adjacent science services.
  - ***Implications:*** relaying ground-to-pilots communications via NGSO satellites Complements terrestrial VHF links, enabling communications with planes everywhere, in oceanic and remote areas.



- **AI 1.9 –** digitalization of HF aeronautical bands
  - WRC-23 added new provisions to RR Appendix 27 to allow the aggregation of existing 3 kHz HF channels and using digital signals
  - ***Implications:*** opens possibility to introduce digital wideband HF systems. HF comms are still extensively used by aviation for long-range communications over oceanic, polar and remote areas.

Agenda item 1.10 – aeronautical non-safety communications
Agenda item 1.11 – modernization of GMDSS

22-22.2 GHz

15.41-15.7 GHz

HF

MF

1 614.4225-1 618.725 MHz or 1 616.3-1 620.38 MHz

2483.59-2499.91 MHz

AI 1.10 15.41-15.7 GHz allocated to secondary AM(OR)S in R1 and 1 R3 country
22-22.2 GHz allocated to primary AM(OR)S in R1 and 5 R3 countries

Implications*: enable transfer large data from aircraft, helicopters, drones for different purposes, e.g., surveillance, monitoring, mapping, etc.*

AI 1.11, Issue A: GMDSS modernization

- removal of NBDP for distress and safety purposes
- introducing automatic connection system (ACS) using DSC in 2/4/6/8/12/16 MHz
- introducing navigation data system (NAVDAT) in MF and HF bands
- **AI 1.11, Issue B: E-Navigation** – NOC

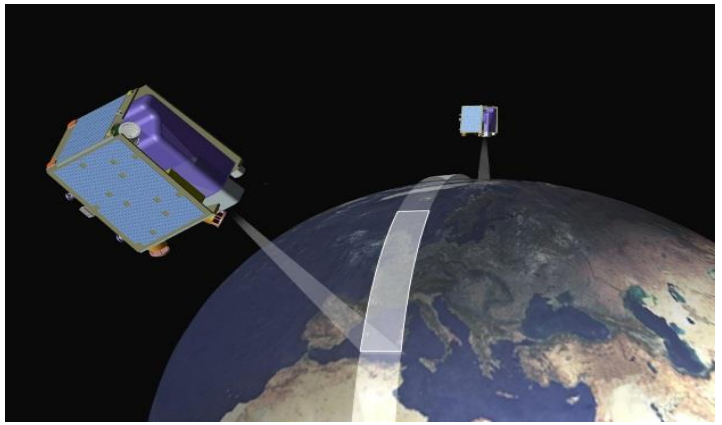
Implications*: WRC-23 endorsed several modern maritime technologies to support GMDSS significantly contributing to the safety of life at sea.*

AI 1.11, Issue C: introduction of additional GMDSS satellite provider

Provisional Beidou recognition subject to completion of coordination and elimination of interference, *see Res. 365 (COM4/5)*

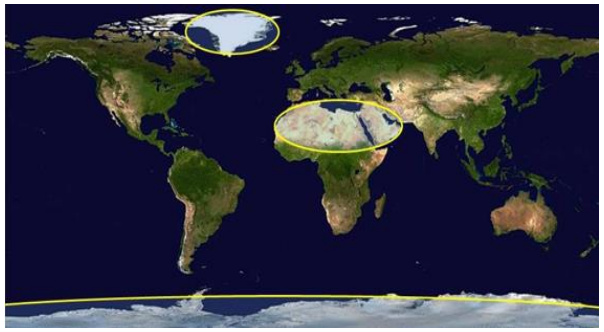
Space science services

(agenda items 1.12, 1.13, 1.14)



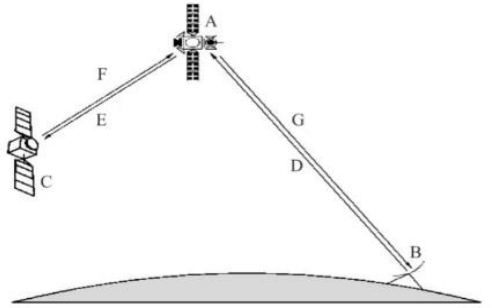
Agenda item 1.12 and 1.13

- **AI 1.12 -** secondary allocation for EESS (active) for spaceborne radar sounders in 40-50 MHz. Protection of existing services by geographical, time, PFD limitations, *see Res. 677 (COM5/6)*



➢ ***Implications:*** *enable collection of data from space-based ground penetrating radars on ice in the polar zone*

- **AI 1.13 -** Upgrade of SRS allocation to primary in the 14.8-15.35 GHz for operation in space-to-space, space-to-Earth and Earth-to-space directions. Protection of FX, MOB, RA, *see Res. 678 (COM5/7)*



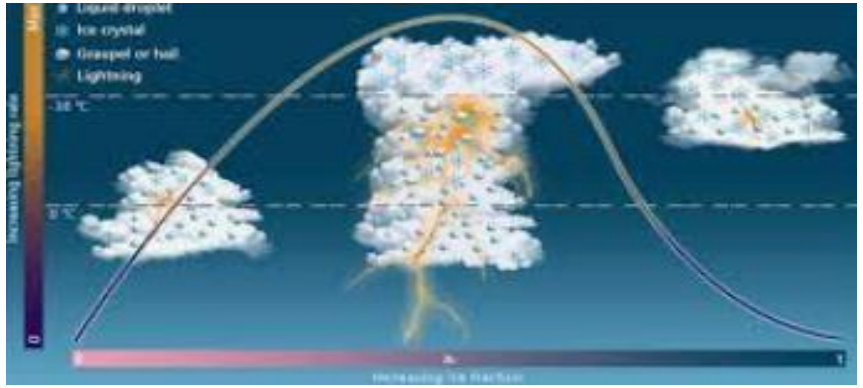
A: DRS
B: DRS earth station
C: DRS user spacecraft
D: Forward feeder link
E: Forward inter-orbit link (IOL)
F: Return IOL
G: Return feeder link

SA.2141-01

➢ ***Implications:*** *will allow for transmission of future scientific data at higher rates*

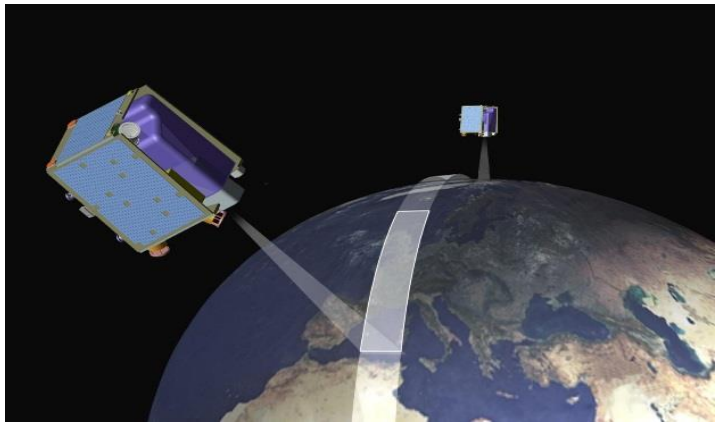
Agenda item 1.14 – EESS (passive) in 231.5-252 GHz

- **AI 1.14 -** allocations to EESS (passive) in 239.2-242.2 GHz and 244.2-247.2 GHz bands. Non-interference basis vs. terrestrial services in 235-238 GHz.
  - ***Implications:*** *enable ice cloud imaging, measurement of chemical processes, including ozone, isotopic oxygen, etc.*



Satellite issues

(agenda items 1.15, 1.16, 1.17, 1.18, 1.19, 7)

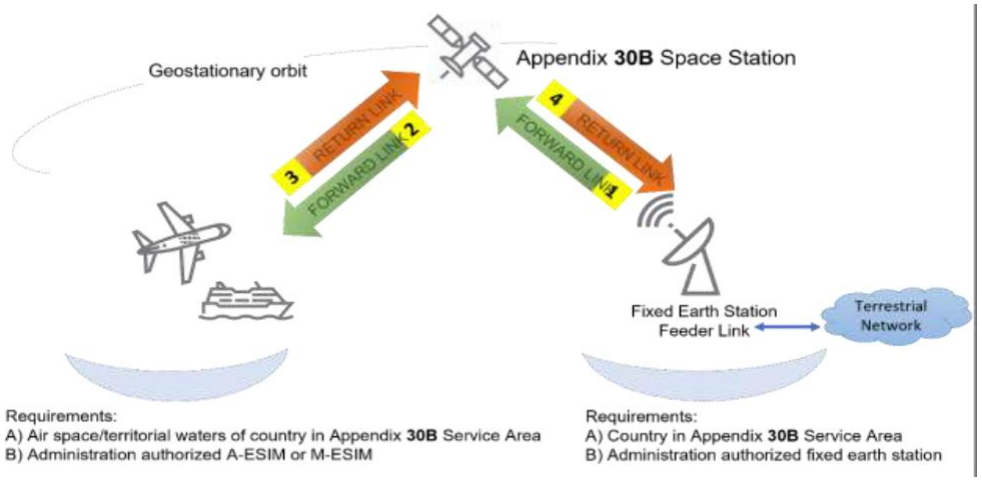


Agenda items 1.15 and 1.16

- **AI 1.15 - GSO ESIMs in 13 GHz**

WRC-23 allowed ESIMs on aircraft and vessels to operate in 12.75-13.25 GHz (uplink) via GSO systems. Protection of AP30B and List, in-band and adjacent band services, compatibility between ESIMs, *see Res. 121 (COM5/2)*

➢ ***Implications:*** *satisfying growing requirements for non-safety communications with aircraft and ships*



- **AI 1.16 - NGSO ESIMs in K_a band**

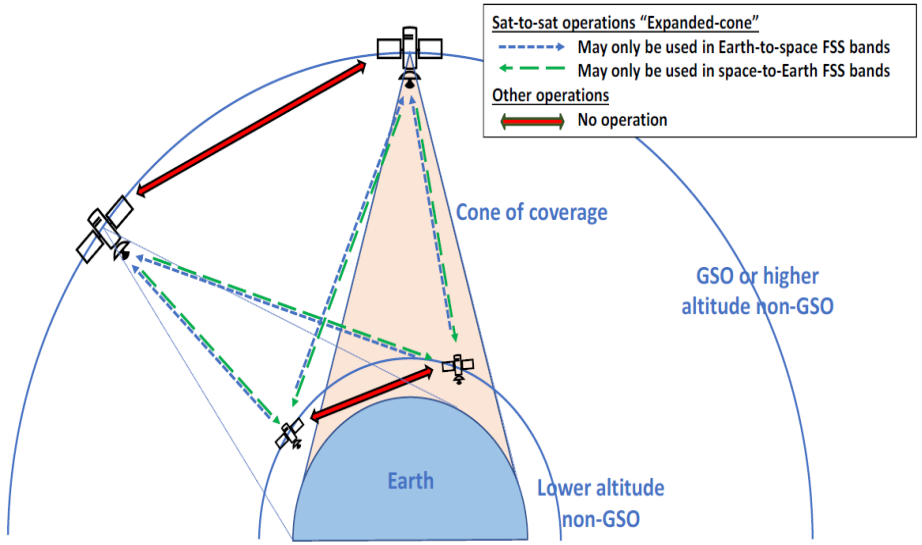
WRC-23 allowed aeronautical and maritime NGSO ESIMs in FSS in 17.7-18.6 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz (downlink) and 27.5-29.1 GHz, 29.5-30 GHz (Uplink). Protection of FX, MOB, satellite and science services. Complex commitment regime monitored by BR, *see Res. 123 (COM5/3).*

Agenda item 1.17 and 1.18

- **AI 1.17 - inter-satellite links in K_a band**

Primary allocation of 18.1-18.6, 18.8-20.2 and 27.5-30 GHz to inter-satellite service. Limited to space research, space operation and/or EESS, and data transmissions of from industrial and medical activities in space. *Res. 679 (COM5/8)*

Implications: *facilitate satellite to satellite data traffic, mainly from/to NGSO satellites which generate the data, e.g. during space, earth science, human exploration missions*



- **AI 1.18 – narrow-band MSS between 1 695 and 3 400 MHz**
  - **NOC** (No change) to RR, due to insufficient sharing studies.
  - But the issue is included in the WRC-27 agenda item 1.13 to support IoT requirements

Agenda item 1.19 – FSS in R2 in 17.3-17.7 GHz

- **AI 1.19 – fixed-satellite service in Region 2 in the band 17.3 – 17.7 GHz**

➢ Primary allocation to FSS in R2 in 17.3-17.7 GHz (space-to-Earth) for GSO and non-GSO networks with protection of existing services, including AP30A BSS feeder-links

Implications: *aimed at harmonization of the band with a similar FSS allocation for Region 1*

- **AI 7 – regulatory issues for satellite services**

13 various topics related to advance publication, coordination, notification and recording procedures for frequency assignments and other regulatory provisions pertaining to satellite networks

Agenda item 7, Topics 7a and 7b

- **7A – Orbit tolerances for NGSO space stations in FSS, BSS, MSS**

  WRC-23 defined tolerances for orbital characteristics of NGSO FSS, BSS and MSS, e.g. apogee altitude, perigee altitude, angle of inclination of the orbital plane, Res. 8 (COM5/4)

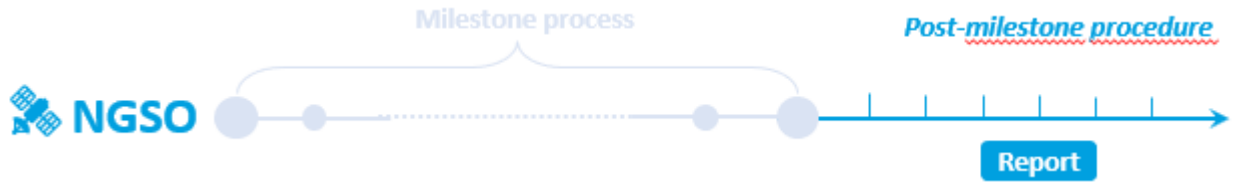
  Implications: *more efficient use of the orbit and spectrum resources*

- **7B – post-milestone procedure for bringing into use NGSO space station**

➢ Modified frequency bands and services for application of the milestone approach

➢ Introduction of a 4-year periodic report of the deployment information, including the number of satellites deployed. Annual reporting in case the number falls below the notified number.

Resolution 35, *see resolves 19 - 23*



Agenda item 7, other Topics

Topic	Title	WC-23 decision
7C	Protection of GSO MSS networks in 7/8 GHz and 20/30 GHz from NGSO	Introduction of a non-interference basis for NGSO networks to protect GSO networks in the same bands
7D1	Modifications to Appendix 1 to Annex 4 of RR Appendix 30B	Correction of formula for calculating aggregate C/I ratio by mentioning correct values of the orbital separation
7D2	New RR AP 4 parameters for Rec. ITU-R S.1503 updates	MOD AP4 to reflect approved modifications in Recommendation ITU-R S.1503
7D3	BR Reminders for BIU and BBIU	BR sends reminders for 90-day requirement for BIU and BBIU. Reminders on completion of 90-day BBIU shall be sent 15 days after the end of the period
7E	RR Appendix 30B improved procedures for new Member States	Modification of Article 7 of Appendix 30B to facilitate creation of new FSS Plan allotments for ITU Member States without any allotment
7F	Excluding uplink service area in AP30A for Regions 1,3 and AP30B	Administration can object to being included in the feeder link service area of any assignment any time (during or after the 4-month period)
7G	Revisions to Resolution 770 (WRC-19) to allow its implementation	Modification of Resolution 770 to add the value of 10% of the probability of non-zero rain attenuation to the parameters of generic GSO reference links
7H	Enhanced protection of APP 30/30A in Regions 1 and 3 and AP 30B	For affected assignment in R1&3 Plan, no decision to assistance reminder = no objection. A commitment to respect the pfd and timeline = agreement
7I	Special agreements under RR Appendix 30B	Possibility to restore reference situation of allotment when assistance under §§ 6.13-6.15 applied by introducing agreement between concerned administrations
7J	Modifications to Res. 76 (protection GSO FSS and BSS from NGSO)	Regular meetings for non-GSO FSS operators to assess interference. Invitation to develop a methodology for calculating aggregate epfd produced by non-GSO FSS
7K	MOD Res. 553 to remove restrictions preventing effective using Resolution	Several mods to the application of the special procedure, e.g., possibility to apply it to 1 network at time, to change, withdraw CR/C sent under normal procedure

Satellite Services

MSS, BSS, FSS, GSO, NGSOs

WRC-27 – FSS, BSS and Satellite regulatory issues

No.	WRC-27 Agenda Item	Description	WRC-23 Resolution	Responsible ITU-R Group
1.1	Aeronautical/maritime ESIMs 47.2-50.2 GHz / 50.4-51.4 GHz	Studies for M-ESIMs/A-ESIMs, actions at WRC-27 to meet increasing needs in mobile satellite broadband	176	WP 4A
1.2	FSS earth stations with smaller antenna in 13.75-14 GHz	Revise sharing conditions in 13.75-14 GHz to allow FSS ES with smaller antennas, to provide for more spectrum	129 (COM6/1)	WP 4A
1.3	Enabling gateway stations in 51.4-52.4 GHz for NGSO FSS	Revise conditions in 51.4-52.4 GHz to enable FSS NGSO gateways for broadband services	130 (COM6/3)	WP 4A
1.4	FSS/BSS allocations in 17 GHz in Region 3	FSS allocation in 17.3-17.7 GHz and BSS in 17.3-17.8 GHz in R3, to globally harmonize FSS, provide BSS spectrum	726 (COM6/24)	WP 4A
1.5	Unauthorized operation of NGSO earth stations	Limit unauthorized operation of NGSO earth stations of FSS/MSS and associated issues of the service area	14 (COM6/6)	WP 4A
1.6	Equitable access to FSS in 40 GHz, 42GHz, 48GHz, 50 GHz	Technical, regulatory measures for equitable access to FSS 37.5-42.5 GHz/42.5-43.5 GHz/47.2-50.2 GHz/50.4-51.4 GHz	131 (COM6/7)	WP 4A

WRC-27 – Mobile Satellite Services

No.	WRC-27 Agenda Item	Description	WRC-23 Resolution	Responsible ITU-R Group
1.11	Space-to-space links in MSS bands 1.5/1.6 GHz, 2.5 GHz MHz	Space-to-space links in MSS bands 1.5/1.6 GHz, 2.5 GHz, for near-real time relay of data to or from the ground	249	WP 4C
1.12	MSS allocations for IoT developments	MSS allocations in 1 427-1 432 MHz, 1 645.5-1 646.5 MHz, 1 880-1 920 MHz for development of IoT through NGSO	252 (COM6/8)	WP 4C
1.13	MSS – IMT direct to device connectivity	MSS allocations in 694 - 2 700 MHz for direct connectivity between space stations and IMT terrestrial devices	253 (COM6/9)	WP 4C
1.14	Additional MSS allocations	Additional MSS allocations in 2 010-2 025 MHz, 2 160-2 170 MHz in R1&3 and in 2 120-2 160 MHz globally	254 (COM6/10)	WP 4C

Direct to Device: Two variations

D2D in MSS bands

- Uses MSS spectrum
- Dedicated, harmonized spectrum simplifies national and international spectrum management
- Leverages 3GPP NTN and TN standards
- Implements standard features in RAN & UE
- Compatibility and interoperability assured
- Current regulatory framework sufficient]
- Roadmap for complete satellite and terrestrial integration in 6G
- Leverages terrestrial and Satellite component of IMT

D2D in MS bands

- Uses MS spectrum
- National interference management to share with terrestrial in-band use International use requires RR No. 4.4
- Leverages 3GPP TN standards
- Uses non-standard features to connect to orbiting base stations
- Compatibility and interoperability not tested
- New regulatory frameworks in development

Source: https://gsoasatellite.com/reports_and_studies/the-future-of-satellite-connectivity-various-approaches-to-direct-to-device-services/

Science services

- Space Research
- Radio Astronomy
- EESS
- Space weather sensors

WRC-27 – Science services

No.	WRC-27 Agenda Item	Description	WRC-23 Resolution	Responsible ITU-R Group
1.15	Space research Services (SRS) for lunar communications	New/modified SRS allocations for systems on lunar surface and between systems in lunar orbit and on lunar surface	680 (COM6/4)	WP 7B
1.16	Radioastronomy operating in specific Radio Quiet Zones	Protection of radioastronomy from NGSO systems in Radio Quiet Zones in some bands between 10.6 and 134 GHz	681 (COM6/11)	WP 7D
1.17	Space weather sensors	Allocations to MetAids service for receive-only space weather sensors and developing protection criteria	682 (COM6/12)	WP 7C
1.18	EESS and Radioastronomy above 76 GHz	Protection of EESS (passive) and radio astronomy above 76 GHz from unwanted emissions of active services	252 (COM6/8)	WP 7C
1.19	EESS (passive) in 4 200-4 400 MHz and 8 400-8 500 MHz	Global allocations to EESS in 4200-4400 MHz, 8 400-8 500 MHz for measurements of sea surface temperature	674 (COM4/8)	WP 7C

Conclusion and next steps

Agenda item 10 – agenda for WRC-27

FIXED-SATELLITE AND BROADCASTING-SATELLITE

- **1.1** **Aeronautical/maritime earth stations in motion**
  47.2-50.2 GHz / 50.4-51.4 GHz
- **1.2** 13.75-14 GHz – **FSS earth stations with smaller antennas**
- **1.3** 51.4-52.4 GHz – **Gateway earth stations for NGSO FSS**
- **1.4** 17.3-17.7/8 GHz – **FSS/BSS allocations in 17 GHz in Region 3**
- **1.5** **Unauthorized operations of NGSO earth stations**
- **1.6** **Equitable access to FSS in the bands**
  37.5-42.5 GHz / 42.5-43.5 GHz / 47.2-50.2 GHz / 50.4-51.4 GHz
- **7** **Satellite regulatory issues**

MOBILE-SATELLITE

- **Space-to-space links** **1.11**
  1 518-1 544 MHz / 1 545-1 559 MHz
  1 610-1 645.5 MHz / 1 646.5-1 660 MHz
  1 670-1 675 MHz / 2 483.5-2 500 MHz
- **MSS - IoT development** **1.12**
  1427-1432 MHz / 1645.5-1646.5 MHz 1880-1920 MHz / 2010-2025 MHz
- **MSS - IMT- direct connectivity** **1.13**
- **MSS – additional allocation** **1.14**

FIXED, MOBILE AND RADIOLOCATION

- **1.7** 4400-4800 MHz / 7125-8400 MHz / 14.8-15.35 – **IMT**
- **1.8** 231.5-275 GHz / 275-700 GHz – **Radiolocation**
- **1.9** **Aeronautical mobile (OR) high frequency modernization**
- **1.10** 71-76 GHz / 81-86 GHz – **Power flux-density / power limits**

SCIENCE

- **Lunar communications** **1.15**
- **Radio Quiet Zones** **1.16**
- **Space weather sensors** **1.17**
- ≥ 76 GHz – **Earth exploration and radio astronomy** **1.18**
- **Earth exploration-satellite service** **1.19**
  4200 – 4400 MHz / 8400-8500 MHz

Key next action

- **All WRC-23 decisions** will enter into force on **1.01.2025,** except the ones listed in Resolution 99 (Rev.WRC-23). All WRC-23 documents can be found here.

✓ **WRC-23 definitive Final Acts** are published in 6 languages free of charge and available at https://www.itu.int/hub/publication/r-act-wrc-16-2024/.

- **New Radio Regulations,** edition 2024 available.

✓ **BR issued Administrative Circular** CA/270 of 26.01.24 on the results of CPM27-1: WRC-27 preparatory studies organization, responsible ITU-R Working Parties, structure of the draft CPM Report, Vice-Chairs, Rapporteurs, etc.

- Administrations need to **update the relevant national documentation**, e.g., National Frequency Allocation Tables

Key messages – *ITU-ITTLLDC seminar 2024 Satellite Services, National Regulatory Frameworks and Partnerships*

- Implement **streamlined licensing procedures** to encourage private sector participation in space activities.
  - *regulatory framework for spectrum allocation, charging and management specific to satellite communications and services.*
  - *Importance of regulatory sandbox testing*

- Develop public-private **partnership models** to attract investment in space infrastructure and services.
  - *innovative funding mechanisms, such as space bonds or dedicated space investment funds, to support long-term space program development and sustainability.*

- Prioritize the development of applications that address specific national challenges, such as agriculture, disaster management, or environmental monitoring.

Key messages – *ITU-ITTLLDC seminar 2024 Satellite Services, National Regulatory Frameworks and Partnerships*

- Facilitate/ **integration of satellite systems** with terrestrial 5G and future 6G networks as a key development in ensuring communication resiliency.
  - *Hybrid network approach including, NTN, LEO, MEO, GEO, combines the global coverage of satellites with the high capacity of terrestrial networks.*

- **Engage** in regional and international space cooperation initiatives to access shared resources and knowledge.

- **Participate actively** in international forums to ensure national interests are represented in global space governance discussions.

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