



| ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY



Aviation Frequency Spectrum and the ITU World Radiocommunication Conferences (WRC)

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Air Navigation Bureau

International Civil Aviation Organization (ICAO)

ITU
WRC-27

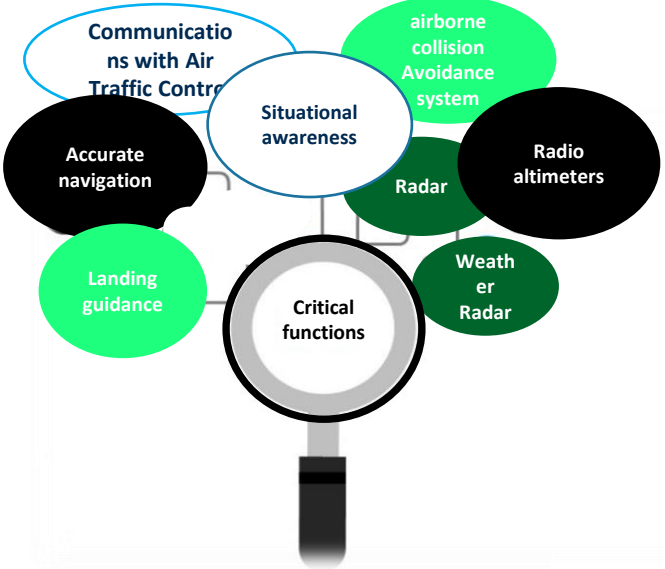


Radionavigation Workshop

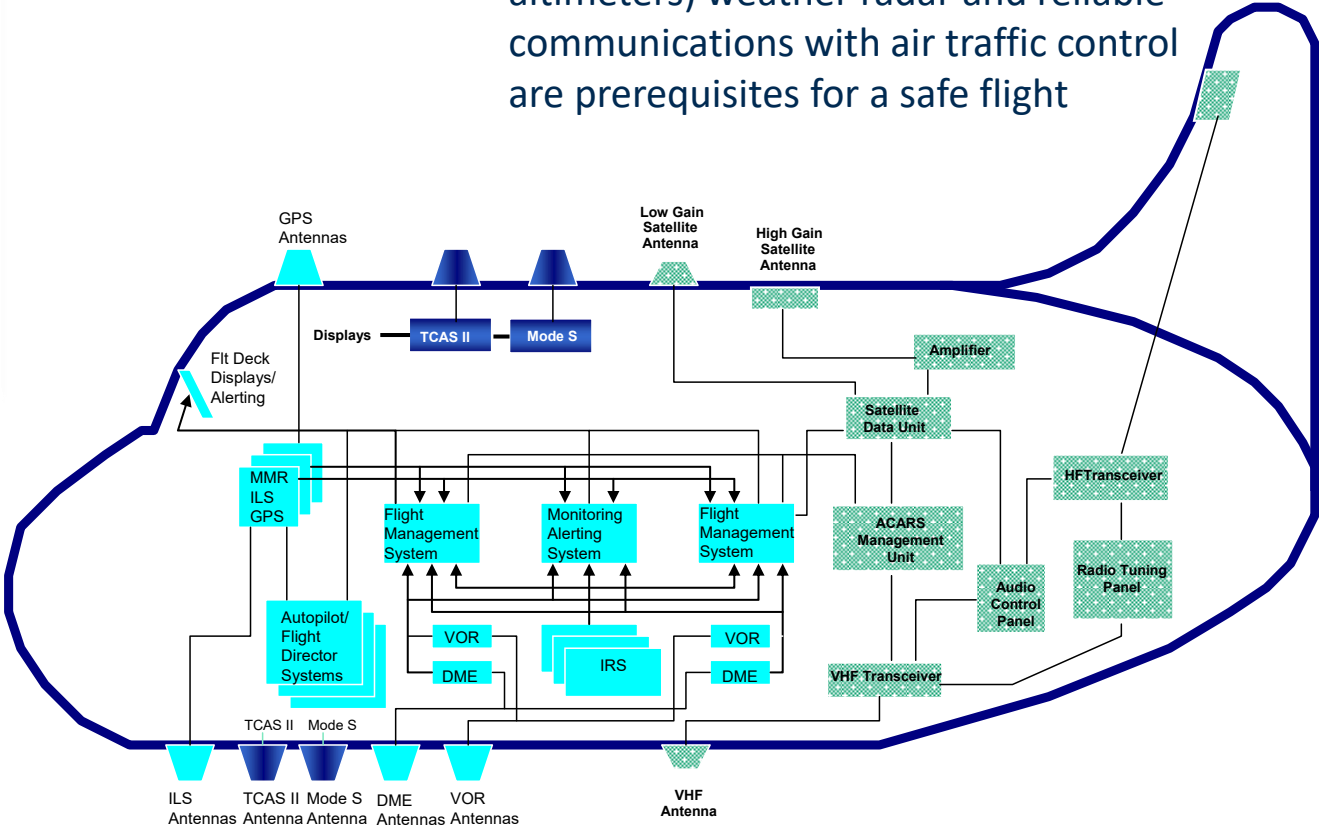
Mexico City, Mexico, 2 - 4 September 2025



CNS Functions Critical to the Safe Flight of Aircraft

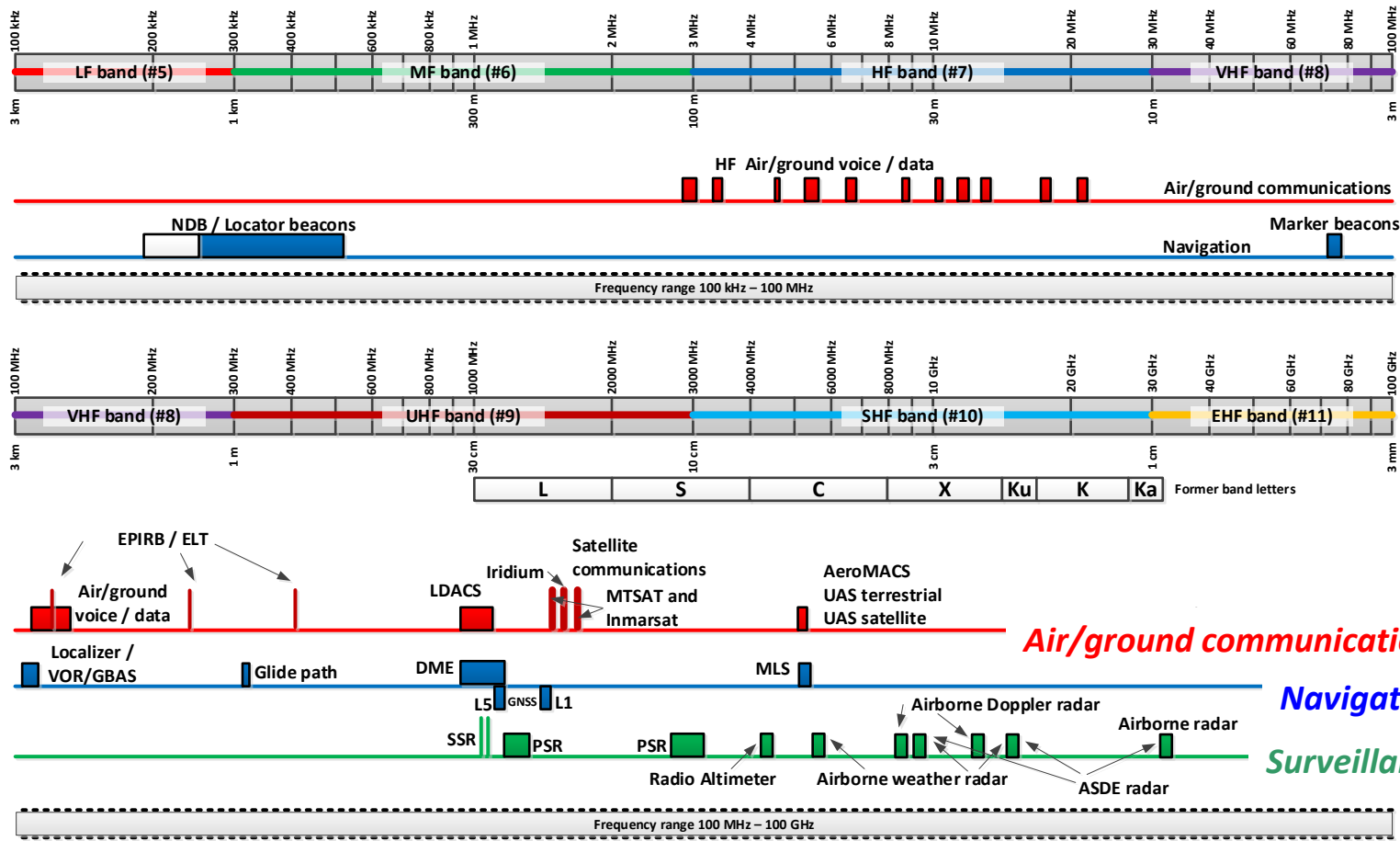


Accurate navigation, landing guidance, situational awareness (airborne collision avoidance system, radar, radio altimeters) weather radar and reliable communications with air traffic control are prerequisites for a safe flight



Spectrum Use for CNS

Over 1 GHz of frequency spectrum in global allocations to aeronautical safety services



Notes:
 Drawing not to scale
 Not all Regional or sub-Regional allocations are shown
 Band identification (e.g. VHF) and band # per Radio Regulations
 The satellite communication bands used by MTSAT and Inmarsat are not allocated the the Aeronautical Mobile Satellite (R) Service

Aeronautical Frequency Spectrum Management

Scarce natural resource with finite capacity limits and constantly increasing demands



Congestion imposes the need for efficient frequency spectrum management

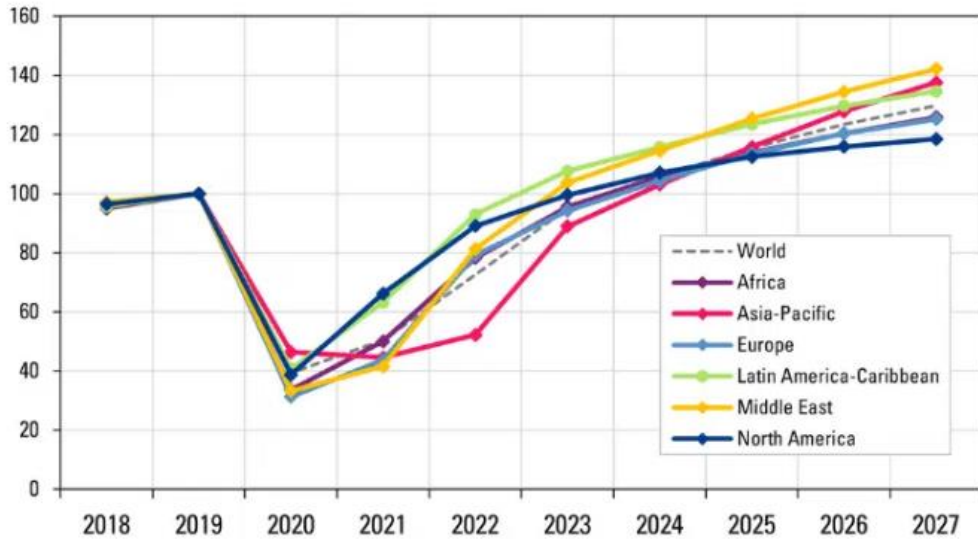
SPECTRUM MANAGEMENT
Combination of administrative and technical procedures



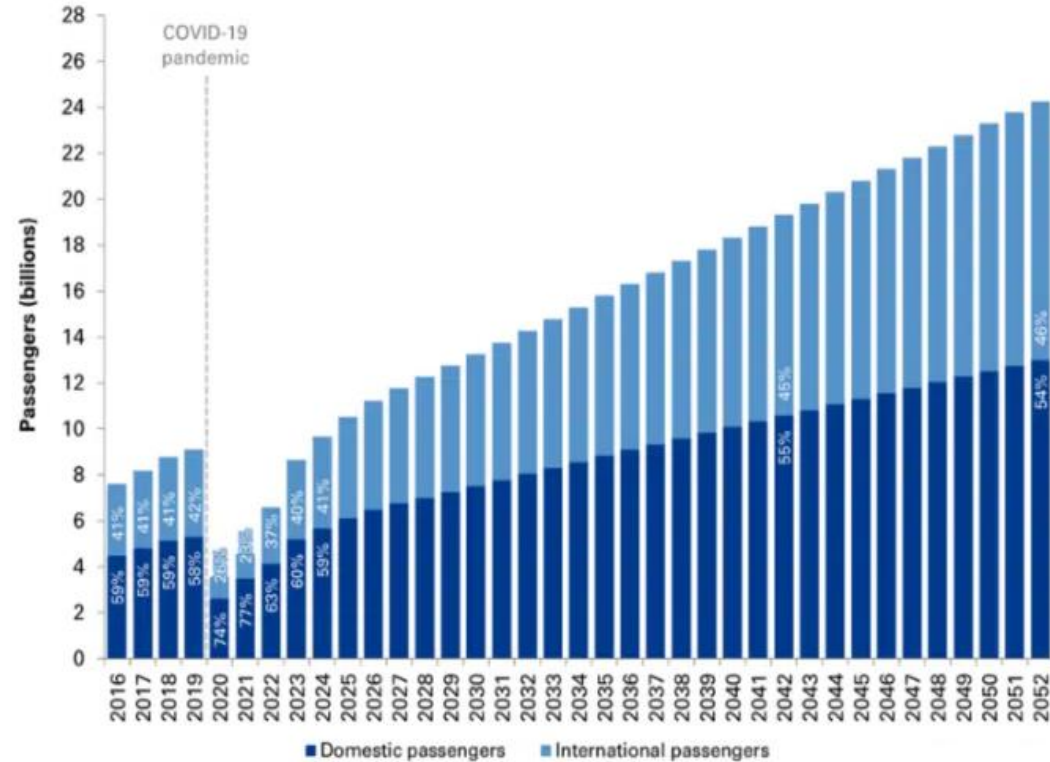
SPECTRUM MANAGEMENT
necessary to ensure interference free and efficient operation of radio services (e.g. Air/Ground Communications and Radionavigation)

Worldwide consistent growth of air traffic

Medium-term passenger traffic forecast by regions
(indexed, 2019 = 100)



Long-term international and domestic passenger traffic (2016–2052)



Between 2023 and 2052, global passenger traffic is expected to reach close to 25 billion, approximately 2.5 times the 2024 projection

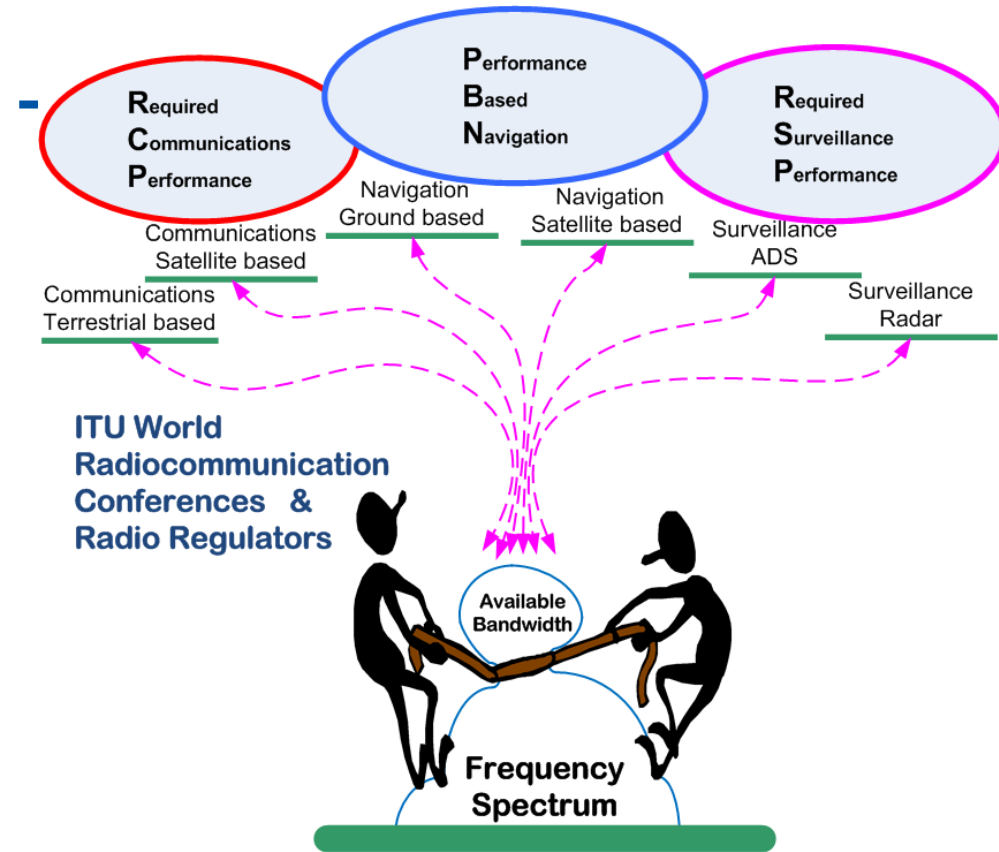
Source: ACI World Airport Traffic Forecasts (WATF) 2023-2052

Performance of Air Traffic Management



Availability and access to frequency spectrum is completely dependent on an outside program:

The ITU World Radiocommunication Conferences; and the WRC preparatory process in the ITU and the Regional Telecommunication Organizations



ITU World Radiocommunication Conferences



The highest level of Spectrum Management takes place at the ITU World Radiocommunication Conferences (WRC), held every four years



Maintenance of the International provisions for Spectrum Management, contained in the ITU Radio Regulations (RR)



This includes maintenance of the Table of Frequency Allocations



A consequence of this process is that aeronautical frequency managers need to develop, and lobby for an aviation position on frequency spectrum use



ITU in brief



UN Specialized agency established to standardize and regulate international radio and telecommunications

Radio Regulations

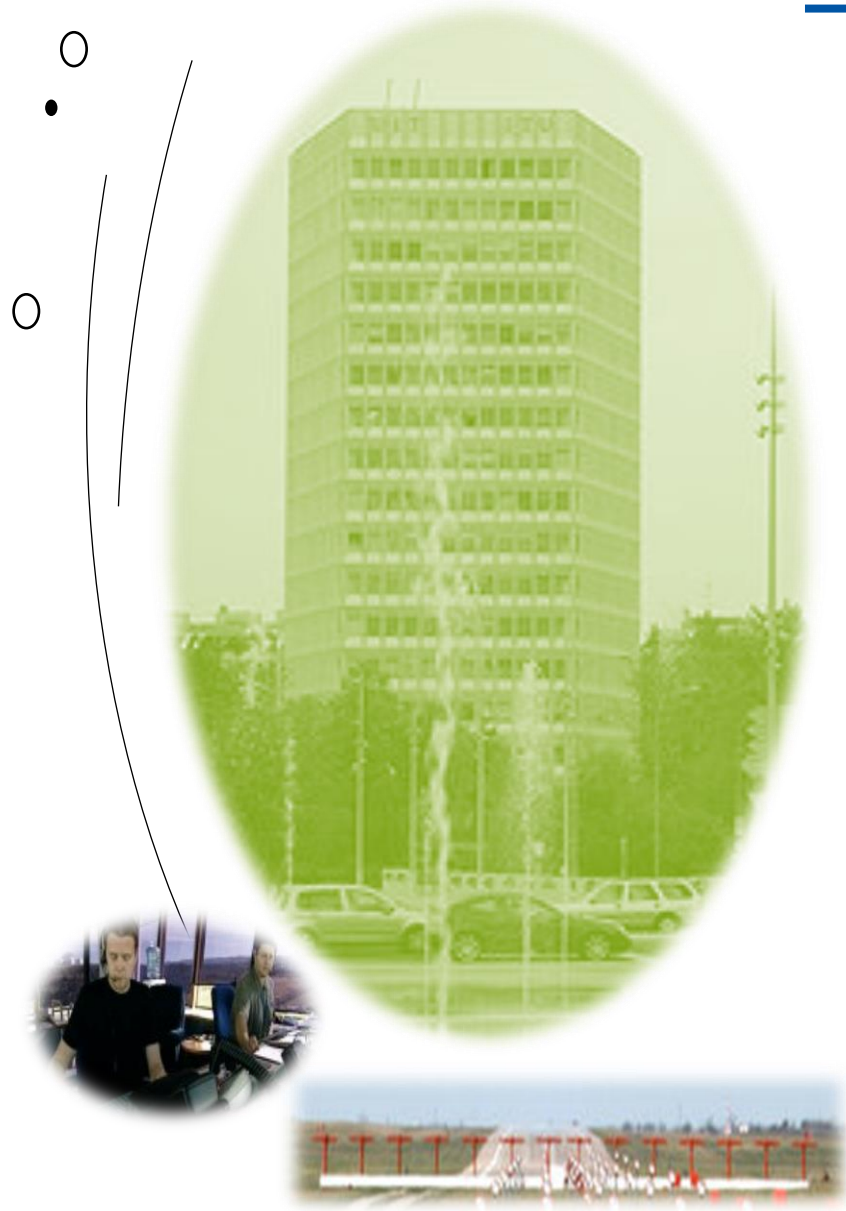
International treaty

- Facilitate equitable access to and rational use of the radio frequency spectrum and the geostationary orbit
- Ensure availability and protection from harmful interference of frequencies for distress and safety purposes
- Assist in prevention and resolution of cases of harmful interference
- Facilitate efficient and effective operation of radiocommunications services
- Provide for, and regulate new applications of telecommunications technology



World Radiocommunication Conferences - General overview

- 1 **WRCs update the International Radio Regulations**
- 2 **Held every 4 years**
 - Last was 20 Nov–15 Dec 2023
 - Next in 2027
- 3 **Main purpose**
 - To revise the Radio Regulations (RR);
 - To address Radiocommunication issues of a worldwide character.
- 4 **Why participate at WRCs**
 - To protect existing services
 - To obtain access to spectrum for new services
 - To enhance spectrum access for existing services
 - To facilitate market access for radio equipment manufacturers; and
 - To provide regulatory certainty to operators



ITU WRC

WRC-23 by numbers

4 Weeks

(5 ½ weeks, when counting RA-23 and CPM27-1)



- 163 Administrations
- Several UN specialized agencies and offices, including ICAO, IMO, WMO, UNOOSA...
- Women 22% of WRC23 delegates

~4000 delegates



- Over 50 meetings/day, including weekends
- After 3AM – latest finish to a meeting
- 9AM - ...start time the next (same) morning

1906



1927



1932



1963



1992



2003



2023



2027



2031



1

WRC History

Since 1906, the ITU World Radiocommunication Conferences provide spectrum and regulations for radio systems

WRCs promote and accommodate all wireless technologies

Aviation is only one of several spectrum users

Some WRC Decisions on Aviation Spectrum

1927	Aeronautical definitions
1938	HF AM(R)S allocations
1947	VHF and UHF ARNS and AM(R)S allocations
1963	First satellite allocations
1969	Plan for HF AM(R)S
1971	Exclusive AMS(R)S allocations 1.5/1.6 GHz
...	...
1997	Exclusive AMS(R)S allocations 1.5/1.6 GHz removed
...	...
2012	5GHz ARNS allocation (MLS) repurposed for AM(R)S and AMS(R)S (RPAS C2-link and AeroMACs)
2015	Allocation for WAIC and Global Flight Tracking, Resolution 155 (FSS for C2 link placeholder)
2019	Averted need for prescriptive ITU regulations on GADSS
2023	Allocations for Space Based VHF and Wide-band HF, Resolution 155 suspended (FSS for C link placeholder)
2027	... maintain interference free operation of aeronautical Radio Altimeters ...

WRC-27 agenda

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** Uplink earth stations – 13.75-14 GHz
 - 1.3** Gateway earth stations – 51.4-52.4 GHz
 - 1.4** Fixed/broadcasting allocation in Region 3 – 17.3-17.7/8 GHz
 - 1.5** Unauthorized operations of non-geostationary-satellite orbit earth stations
 - 1.6** Space sustainability
37.5-42.5 GHz / 42.5-43.5 GHz / 47.2-50.2 GHz / 50.4-51.4 GHz
 - 7** Satellite regulatory issues
-
- 1.7** IMT
4400-4800 MHz / 7125-8400 MHz / 14.8-15.35
 - 1.8** Radiolocation
231.5-275 GHz / 275-700 GHz
 - 1.9** Aeronautical mobile (OR) high frequency modernization
 - 1.10** Power flux-density / power limits
71-76 GHz / 81-86 GHz

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 - Allocations for IoT development** **1.12**
1427-1432 MHz / 1645.5-1646.5 MHz
1880-1920 MHz / 2010-2025 MHz
 - MSS - IMT-space stations connectivity** **1.13**
 - MSS - Additional allocations** **1.14**
2010-2025 MHz / 2160-2170 MHz
2 120-2 160 MHz
-
- Lunar communications** **1.15**
 - Radio Quiet Zones** **1.16**
 - Space weather sensors protection** **1.17**
 - ≥ 76 GHz – Earth exploration service protection** **1.18**
 - Earth exploration-satellite service allocation** **1.19**
4200 – 4400 MHz / 8400-8500 MHz

FIXED, MOBILE AND RADIOLOCATION

SCIENCE

19 agenda items + 11 standing agenda items.
80 % of the WRC-23 Agenda are space related issues

WRC-27 preparation cycle



Main WRC-27 Agenda Items relevant to Aviation

1.7

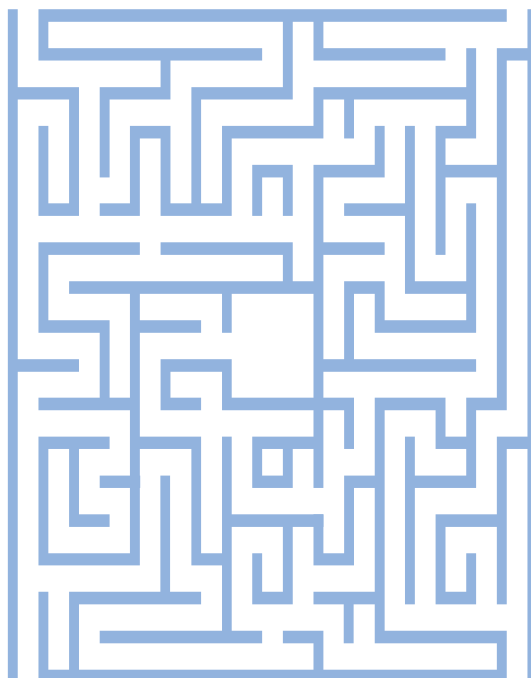
Use of IMT in the frequency bands 4400-4800 MHz

1.9

Update Appendix 26 –
Aeronautical Mobile OR high-frequency modernization

1.17

Space weather sensors



1.19

Primary allocations to the EESS passive in the bands 4200-4400

9.1

Urgent action by Study groups in prep for the next WRC

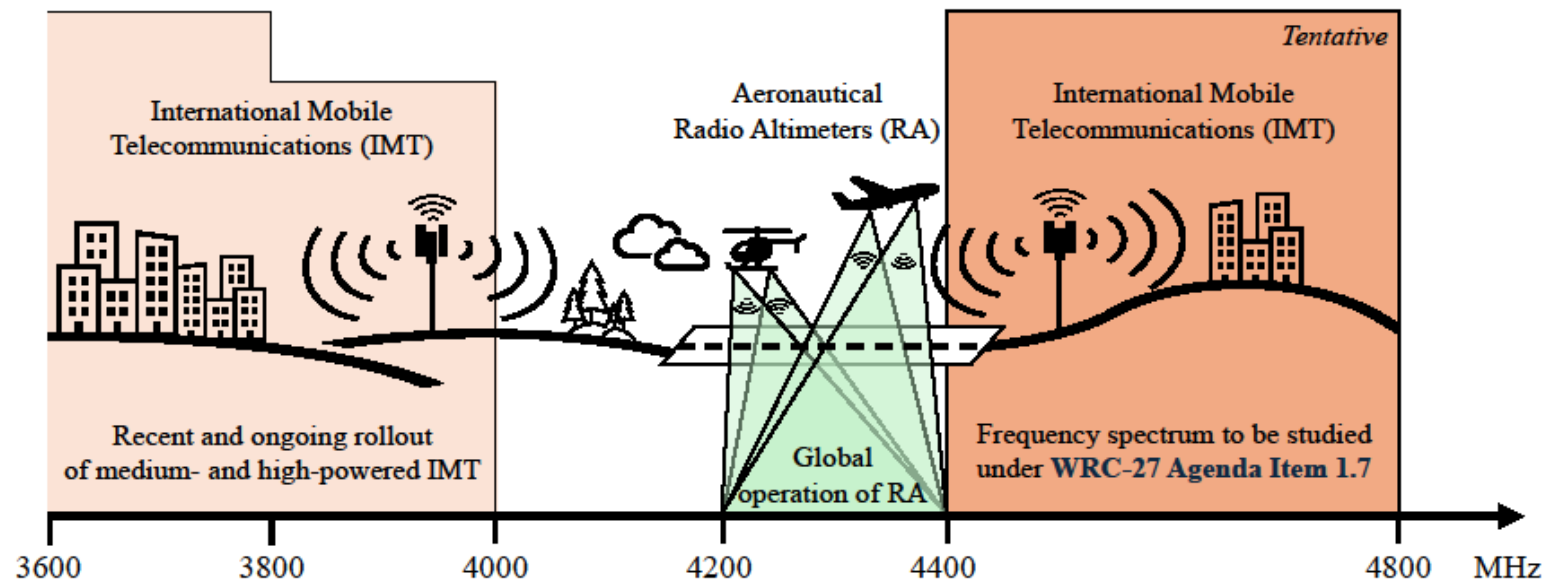
- C2 LINK

And many others...
For example, 1.11, 1.12 and 1.13

WRC-27 Agenda Item 1.7:

Study on IMT use in the frequency bands 4400-4800 MHz, 7125-8400 MHz and 14.8-15.35 GHz

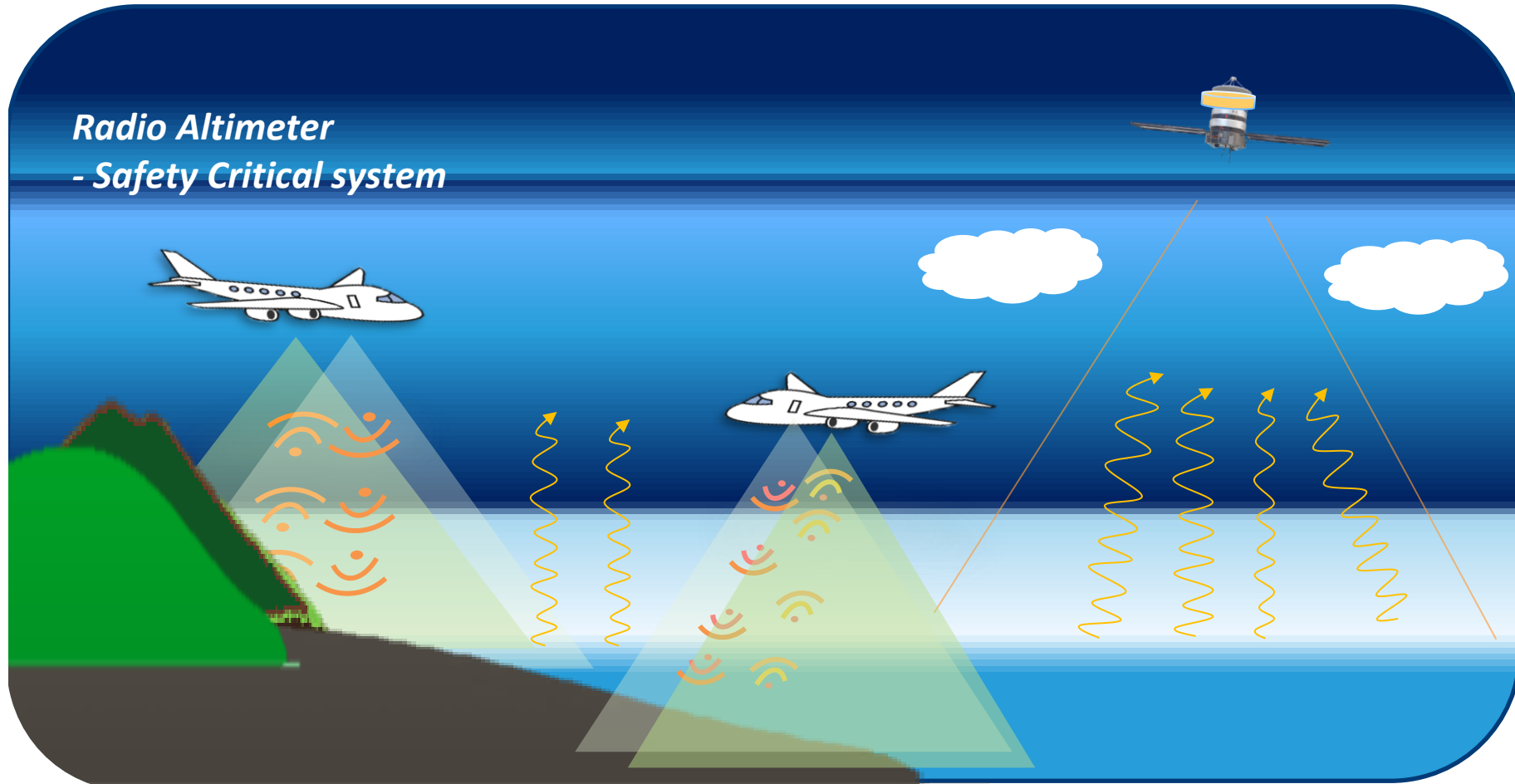
- Looks to identify the frequency band immediately above the Radio Altimeter band to International Mobile Telecommunications.
- Radio Altimeters are a critical safety system.
- In the current ITU preparatory studies (ITU-R WP 5B and WP 5D) due account is not being taken of the safety critical role of the radio altimeters.



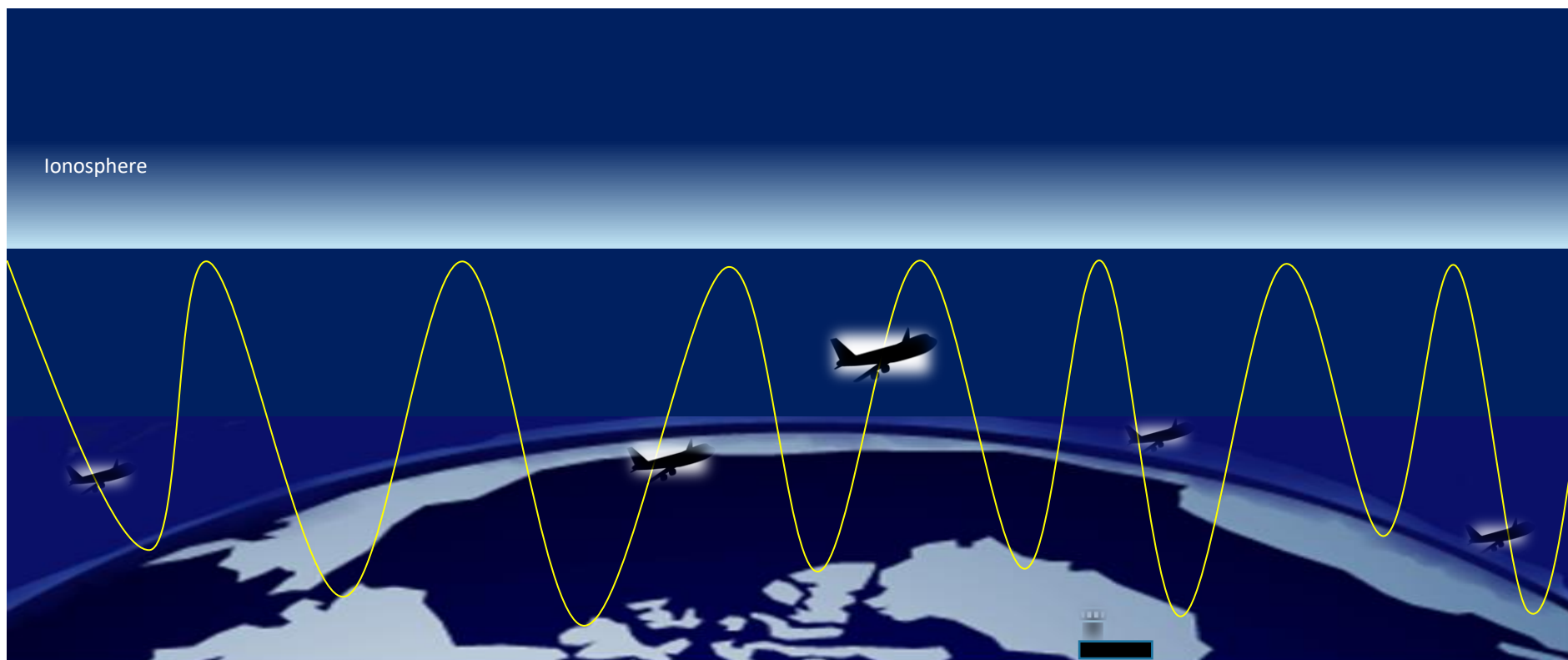
Should Aviation Authorities fail to step up and actively provide expert representation and advice in the ITU World Radiocommunication Conference preparatory process, this may result in unsustainable loss of critical functions necessary for maintaining the current level of safety in aviation

WRC-27 Agenda Item 1.19:

Primary allocations to the EESS passive in the bands 4200-4400



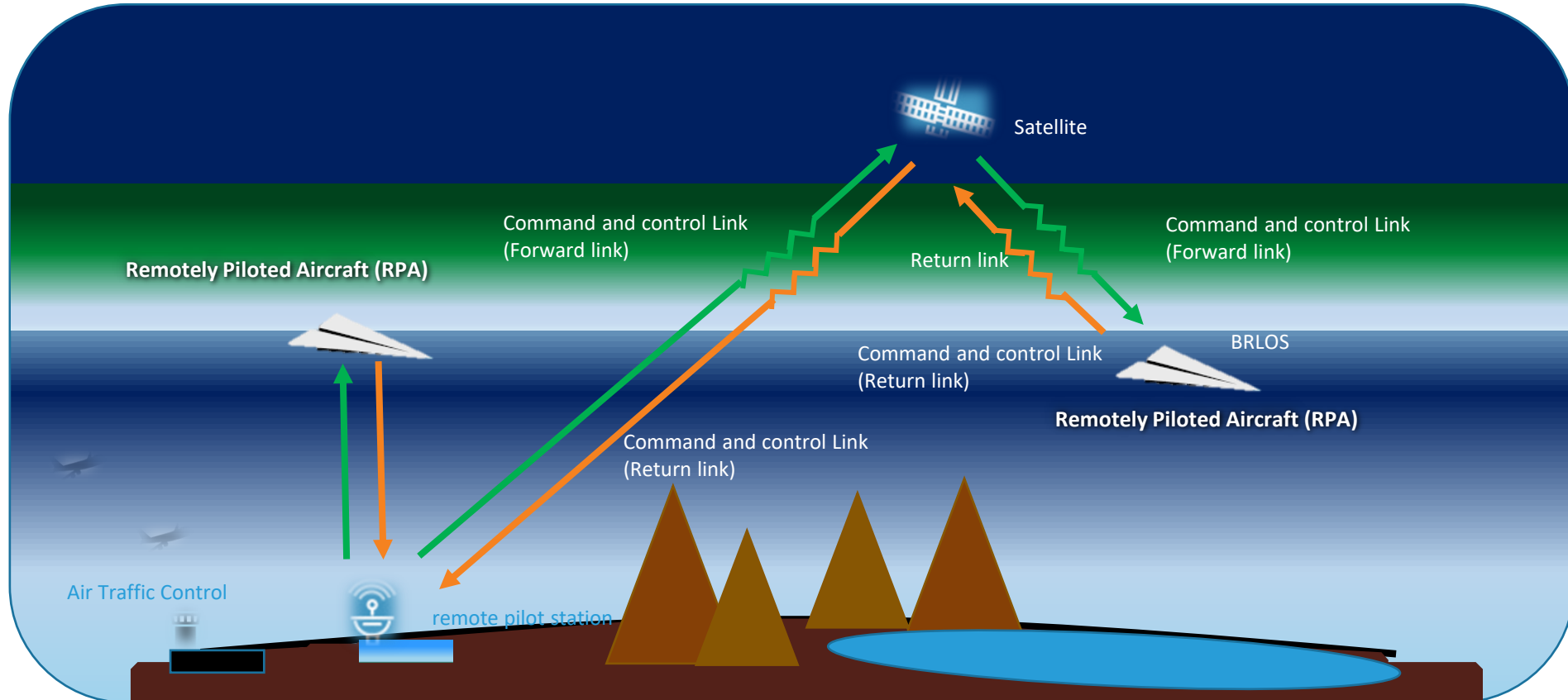
WRC-27 Agenda Item 1.9: Update Appendix 26 in support of aeronautical mobile (OR) high frequency modernization



WRC-27 Agenda Item 1.17: Space Weather Sensors



WRC-27 Agenda Item 9.1: Urgent action by Study groups in prep for the next WRC beyond-line-of-sight C2-link for RPAS



National and Regional Preparations



- National position is developed and coordinated by the National Frequency Spectrum authority
- Aviation is but one of many users that lobby for attention

National level



- National telecommunications authorities co-ordinate their position through regional organizations
- Aviation representatives may not be allowed to speak up as the National Frequency Spectrum Authority has only “one official position”
- ICAO is allowed to participate

Regional Level



- National telecommunications authorities co-ordinate their position through the ITU-R Study Groups
- National delegation has only “one official position”
- States look to ICAO for guidance on aviation matters

International level

ITU-R Preparatory Studies for WRC-27

www.itu.int/go/rcpm-wrc-27-studies

WRC-27 Agenda Item (Chapter)	Topic	WRC Resolution	Responsible Group(s)	Information from Responsible Group(s)
1.5 (1)		Res.14 (WRC-23) (ex.COM6/6)	WP 4A	Doc. 4A/567 (d) (Rev.1) Sec. 2.8.1, 2.9.2, 3.4, 3.4.1, 3.4.4, 4, 4.1.4.2, Annex 10, Annex 11 (c)
1.7 (2)		Res.256 (WRC-23) (ex.COM6/26)	WP 5D	Doc. 5D/792 (d) (a), Chapter 1 (a), Annex 1.1 (a), Chapter 2 (a), Annex 2.9.6 (b), Chapter 4 (a), Annexes 4.8, 4.9 (c), 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19(Rev.1), 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.27, 4.28, 4.29, 4.30, Chapter 6 (a), Chapter 7 (a)
1.9 (2)		Res.411 (WRC-23) (ex.COM6/2)	WP 5B	Doc. 5B/96 Annex 1 (b), Doc. 5B/315 (d), Chapter 1 (Rev.1) (a), Chapter 3 (a), Annex 3.1 (f)
1.11 (3)		Res.249 (Rev.WRC-23)	WP 4C	Doc. 4C/356 (d) Sec. 2.3, 2.4, 3.1.1, 3.1.5.1, 3.2.7, 4.1.5.4, 4.2, 4.2.1, 4.2.3, Annex 1 (c), Annex 2, Annex 3 (b), Annex 19
1.12 (3)		Res.252 (WRC-23) (ex.COM6/8)	WP 4C	Doc. 4C/356 (d) Sec. 2.3, 2.4, 3.1.2, 3.1.5.1, 3.1.5.2, 4.1, 4.1.1, 4.1.5.2, 4.1.5.4, 4.1.5.5, Annex 4, Annex 5 (b), Annex 13, Annex 19
1.13 (3)		Res.253 (WRC-23) (ex.COM6/9)	WP 4C (3)	Doc. 4C/356 (d) Sec. 2.2, 2.3, 2.4, 3.1.2, 3.1.3, 3.1.5.1, 3.1.5.2, 3.2.7, 4.1, 4.1.2, 4.1.2.1, 4.1.5.2, 4.1.5.4, 4.1.5.5, 4.1.5.6, 4.2.3, Annex 6, Annex 7 (Part 1), Annex 8 (b), Annex 9, Annex 13, Annex 19
1.17 (4)		Res.682 (WRC-23) (ex.COM6/12)	WP 7C	Doc. 7C/236 (d) Sec. 2.1, 2.2, 4, 4.1, 8.1, Annex 5 (e), Annex 6 (f), Annex 7 (c)
1.19 (4)		Res.674 (WRC-23) (ex.COM4/8)	WP 7C	Doc. 7C/236 (d) Sec. 2.1, 2.2, 5.1, 5.2, 8.1, Annex 13 (f), Annex 14 (c), Annex 15 (b)

- The Table is as of 1 September 2025
- Updated on a regular basis after meetings of the responsible groups

ITU Radio Regulations update cycle

- A very competitive environment
 - Aviation or any other sector cannot expect preferential treatment
 - Those that do their homework and participate succeed, others lose



Definition of Radio Frequency Management:

“Radio frequency management is done by experts who meld years of experience with a curious blend of regulation, electronics, politics and not a little bit of larceny. They justify requirements, horsetrade, coerce, bluff and gamble with an intuition that cannot be taught other than by long experience.”

Vice Admiral Jon L. Boyes
U.S. Navy

Assembly Resolution A41-7

Urges Member States, international organizations and other civil aviation stakeholders to support firmly the ICAO frequency spectrum strategy and the ICAO position at WRCs and in regional and other international activities conducted in preparation for WRCs, including by the following means:

BE RESPONSIBLE	working together to deliver spectrum-efficient aeronautical systems as well as frequency management that meet current best practices
BE ACCOUNTABLE	supporting ICAO activities relating to the aviation frequency spectrum strategy and policy through relevant expert group meetings and regional planning groups
ADOPT A COMMON AVIATION POSITION	undertaking to provide for aviation interests to be fully integrated in the development of their positions presented to regional telecommunications fora involved in the preparation of joint proposals to the WRC including in their proposals to the WRC, to the extent possible, material consistent with the ICAO position
SUPPORT	supporting the ICAO position and the ICAO policy statements at ITU WRCs
PARTICIPATE	undertaking to provide civil aviation experts to fully participate in the development of States' and regional positions and development of aviation interests at the ITU
REPRESENT AVIATION INTERESTS	ensuring, to the maximum extent possible, that their delegations to regional conferences, ITU study groups and WRCs include experts from their civil aviation authorities and other civil aviation stakeholders who are fully prepared to represent aviation interests

Assembly Resolution A41-7

Urges Member States to consider, as a priority, public and aviation safety when deciding how to enable new or additional services, and to consult with aviation safety regulators, subject matter experts and airspace users, to provide all necessary considerations and to establish regulatory measures to ensure that incumbent aviation systems and services are free from harmful interference:

Requests the Secretary General to bring to the attention of ITU the importance of adequate radio frequency spectrum allocation and protection for the safety of aviation; and

Instructs the Council and the Secretary General, as a matter of high priority within the budget adopted by the Assembly, to ensure that the resources necessary to support the development and implementation of a comprehensive aviation frequency spectrum strategy, as well as increased participation by ICAO in international and regional spectrum management activities are made available

Thank You

