AVIATION FREQUENCY SPECTRUM AND THE ITU WORLD RADIOCOMMUNICATION CONFERENCES (WRC)

ITU
WRC-23

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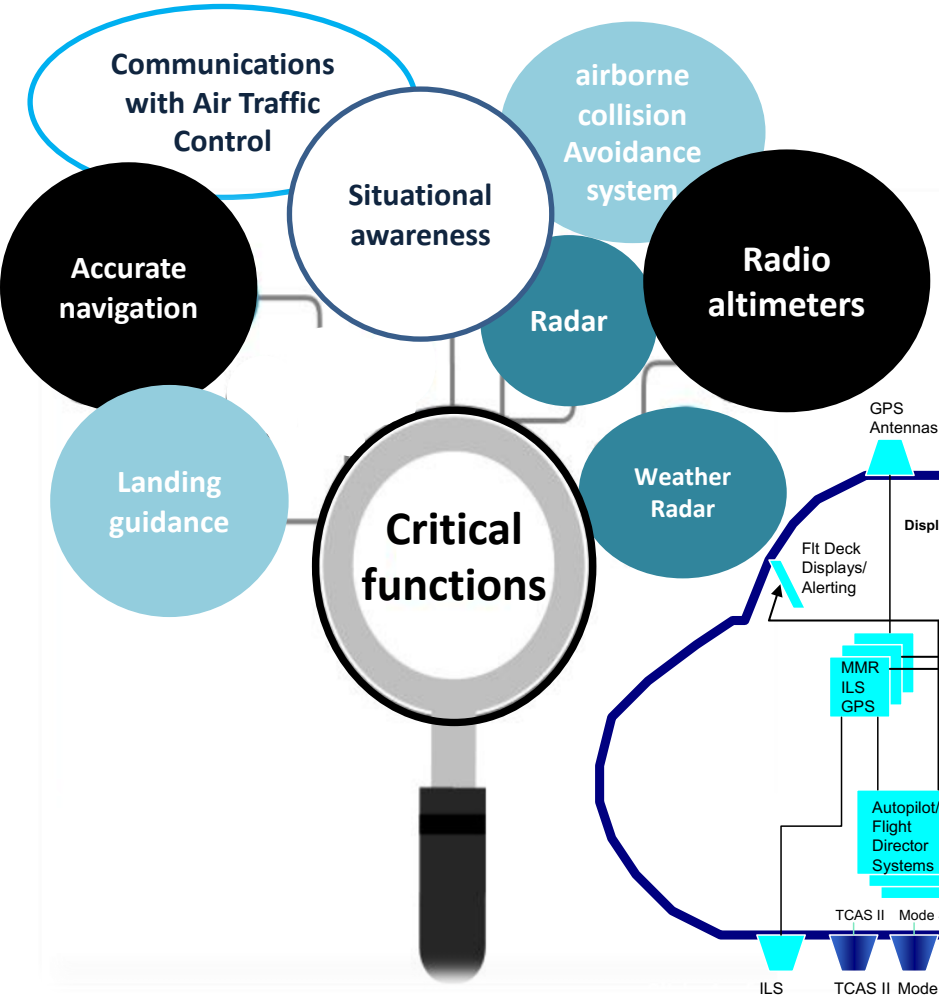
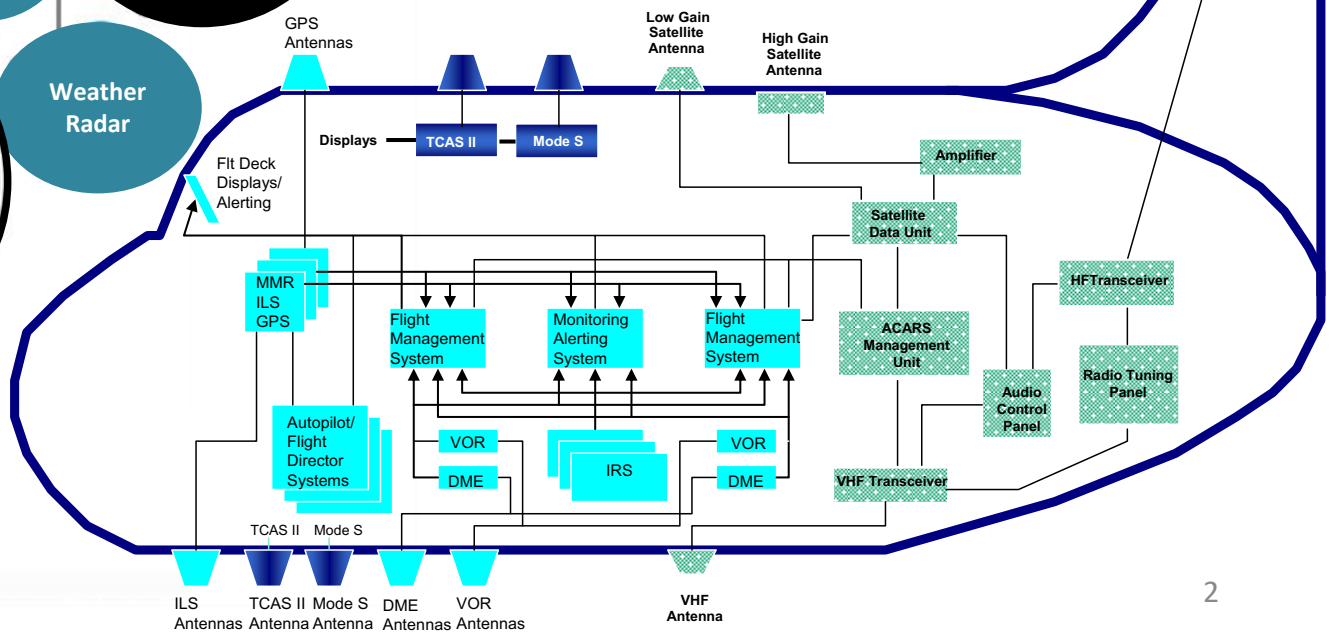
Aeronautical Frequency Spectrum Management

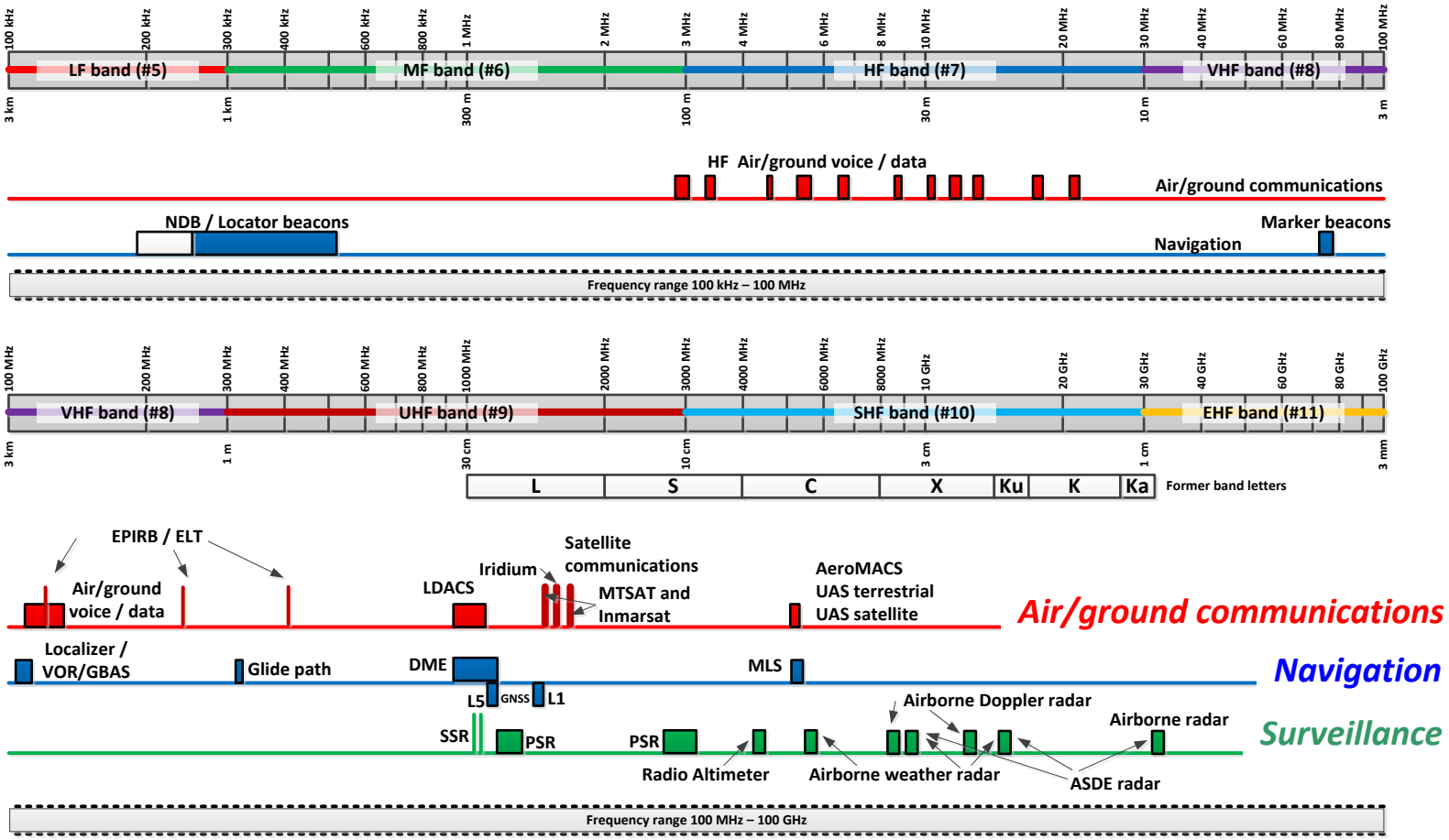


Accurate navigation, landing guidance, situational awareness (airborne collision avoidance system, radar, radio altimeters) weather radar and reliable communications with air traffic control are prerequisites for a safe flight



Aeronautical Frequency Spectrum Management

- **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 Satellte (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

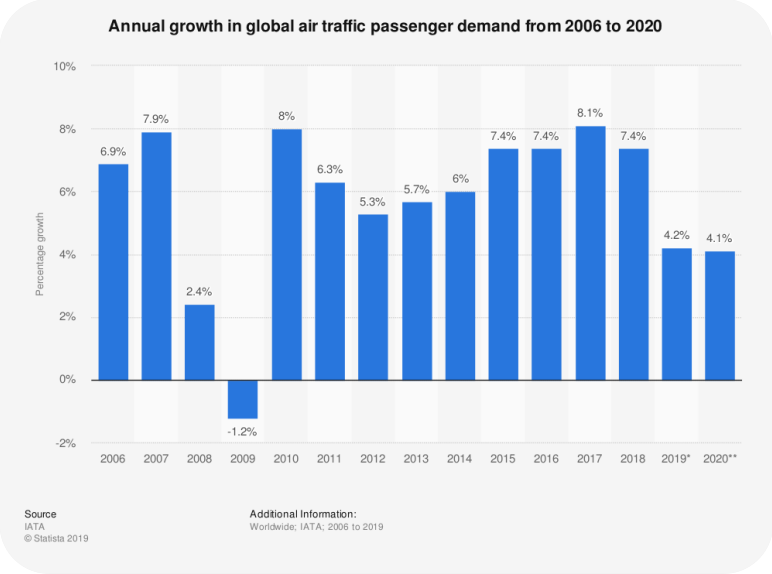
SPECTRUM MANAGEMENT

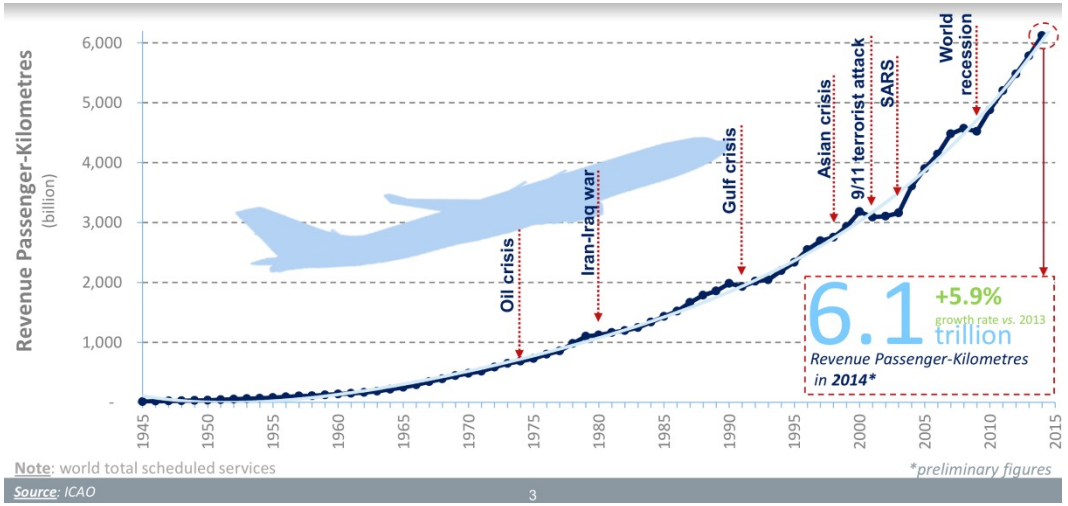
Combination of administrative and technical procedures

SPECTRUM MANAGEMENT

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

Aeronautical Frequency Spectrum Management





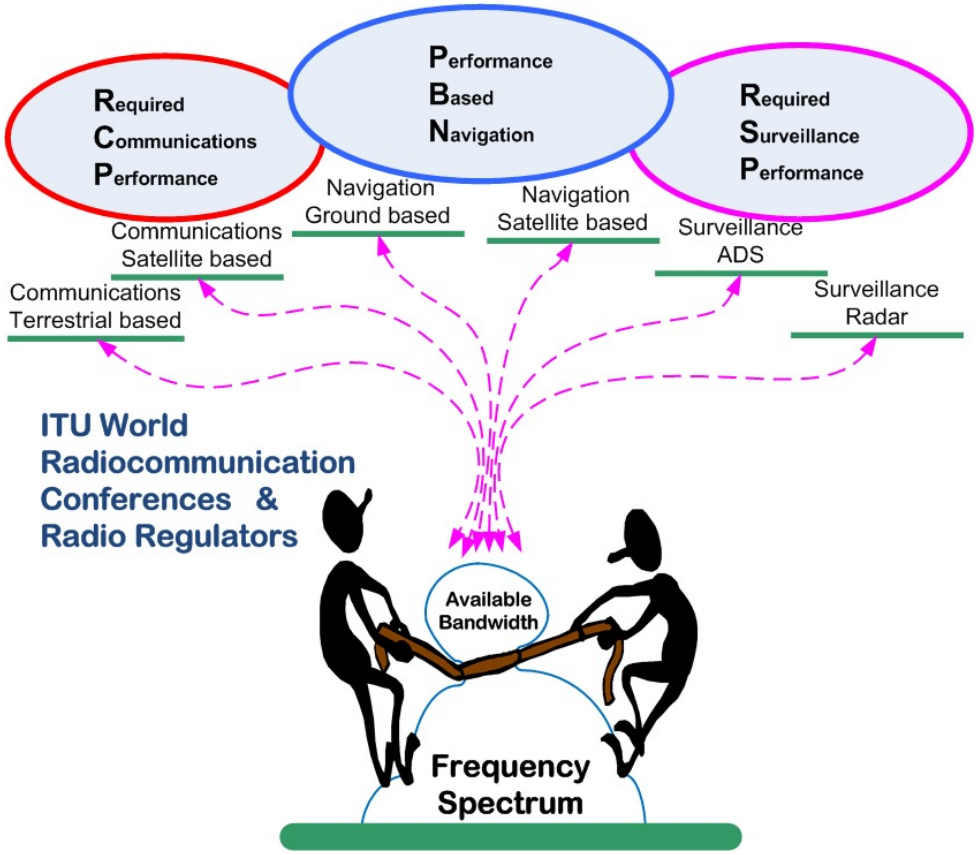
World wide consistent growth of air traffic
Doubles every 15 years

- In **2019** over **4.5 billion scheduled passengers**
- **Air transport** now **carries 35% of world trade**, by value
- **Between 2019 and 2038**, 4.6 % expected growth of no. of airline passengers (pre-Covid-19 numbers)

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



Aeronautical Frequency Spectrum Management

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

Aeronautical Frequency Spectrum Management

- 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

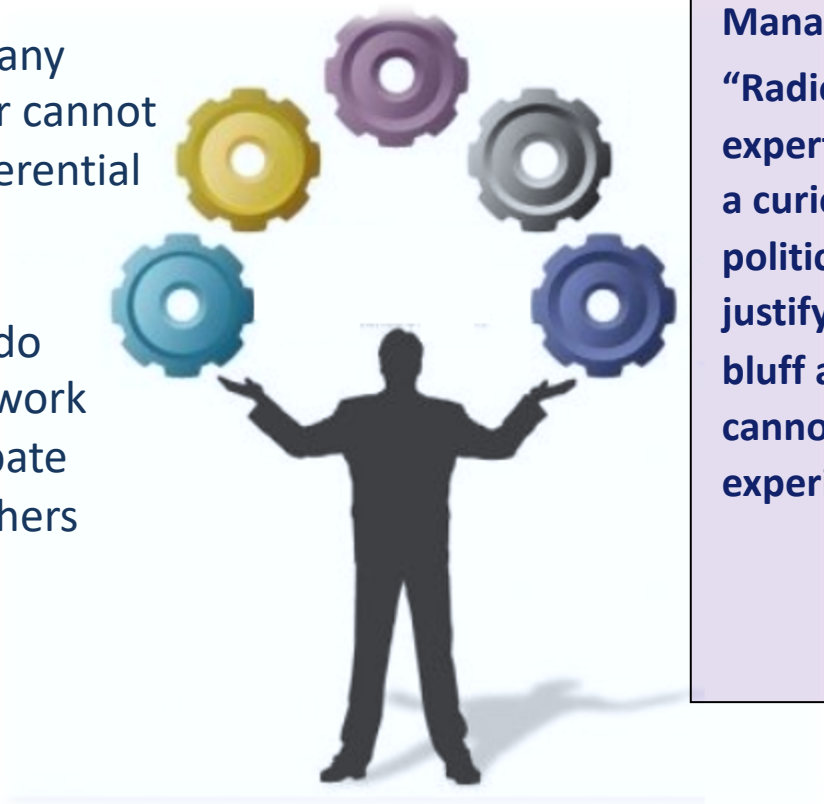
- National telecommunications authorities co-ordinate their position through the ITU-R Study Groups
- National delegation has only “one official position”
- States look to ICAO for guidance on aviation matters

International level

Aeronautical Frequency Spectrum Management

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

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

ITU WRC - General overview

1 **WRCs update the International Radio Regulations**

2 **Held every 4 years**
- Last was 28 Oct - 22 Nov 2019
- Next in Q4 2023

3 **Main purposes**
- To revise the Radio Regulations (RR);
- To address Radiocommunication issues of a worldwide character.

4 **Why participate at World Radiocommunication Conferences**
- 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-19 by numbers

~3500 delegates

- Over 50 meetings/day, including weekends
- After 4AM – latest finish to a meeting
- 9AM - …start time the next (same) morning

4 Weeks

(5 ½ weeks, when counting RA-19 and CPM19-1)

ITUWRC
SHARM EL-SHEIKH2019
28 October - 29 November 2019
Sharm El-Sheikh, Egypt

- 165 Administrations
- Several UN specialized agencies and offices, including ICAO, IMO, WMO, UNOOSA…
- 260 other international / regional, scientific and industrial agencies or organizations.

ITU WRC-19

Main Outcomes

- **Aeronautical communications**

Agenda Item 1.10: Spectrum needs and regulatory provisions for the introduction and use of the global aeronautical distress and safety system (GADSS)

- A proposal was supported by many administrations, requiring that details on the technical characteristics for radiocommunication systems used for GADSS should be reflected in the ITU Regulatory framework.
- This proposal, if enacted, could potentially delay implementation of the GADSS
- Proposal was averted, thus **ensuring that GADSS provisions can continue to stay performance based**

ITU WRC-19

Main Outcomes

- **Maritime communications**

Agenda Item 1.8: Possible regulatory actions to support the modernization of global maritime distress and safety systems (GMDSS)

- Measures were adopted to modernise the GMDSS and to include a new satellite system provider
- The proposals for the conference, if enacted, **would have lost the priority and protection access by aviation** to the system operated by the same satellite provider
- Through ICAO efforts, **this was averted** and in fact the aeronautical priority access was strengthened by removing existing inconsistencies

ITU WRC-19

Main Outcomes

- **Scientific use of spectrum**

Agenda Item 1.7: Spectrum needs for telemetry, tracking and command in the space operation service (SOS) for non-GSO satellites with short duration missions (non-GSO SD)

- A large number of non-GSO SD satellites are envisaged, causing considerable loading on frequency band(s) selected
- The aeronautical VHF Data Link Mode 2 (VDLM2) system, operating at the top of the aeronautical VHF band (136.975 MHz) at high risk of interference
- Very difficult discussion resulted in a compromise:
  - a 25 kHz guard band; and
  - an ITU Resolution which requires as a minimum, the whole of the occupied bandwidth of the emissions by the non-GSO SD SOS stations is maintained completely above 137 MHz
- Efforts need to be undertaken by aviation stakeholders to ensure the continued safe operation of VDLM2

ITU WRC-19

Main Outcomes

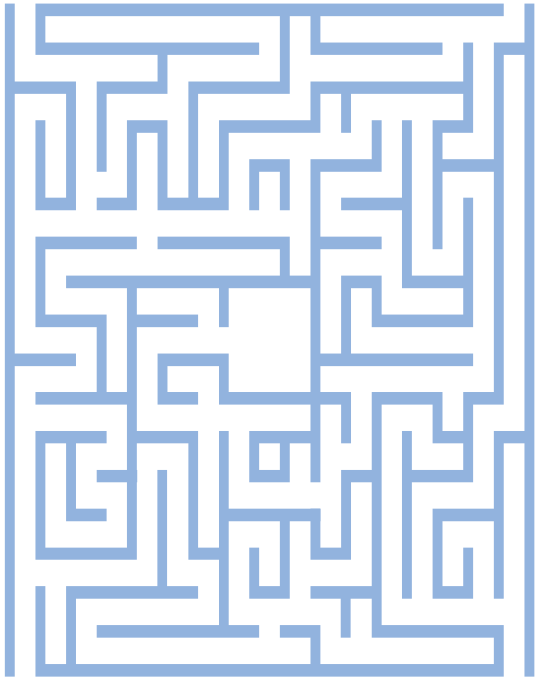
- **Other relevant items**

  Agenda Item 9.1.4: Stations on-board sub-orbital vehicles

- A new WRC-23 item decided, to consider regulatory provisions to facilitate the introduction of sub-orbital vehicles, in particular any potential new/modified definitions in the RR to accommodate such operations
- ICAO to participate in the studies and provide ITU with the relevant technical characteristics required for the studies
- Appropriate solution by WRC-23 could for instance facilitate tracking of space launch vehicles by ADS-B, thus reducing any impact caused by space launches and by reducing the size of the restricted area of affected airspaces

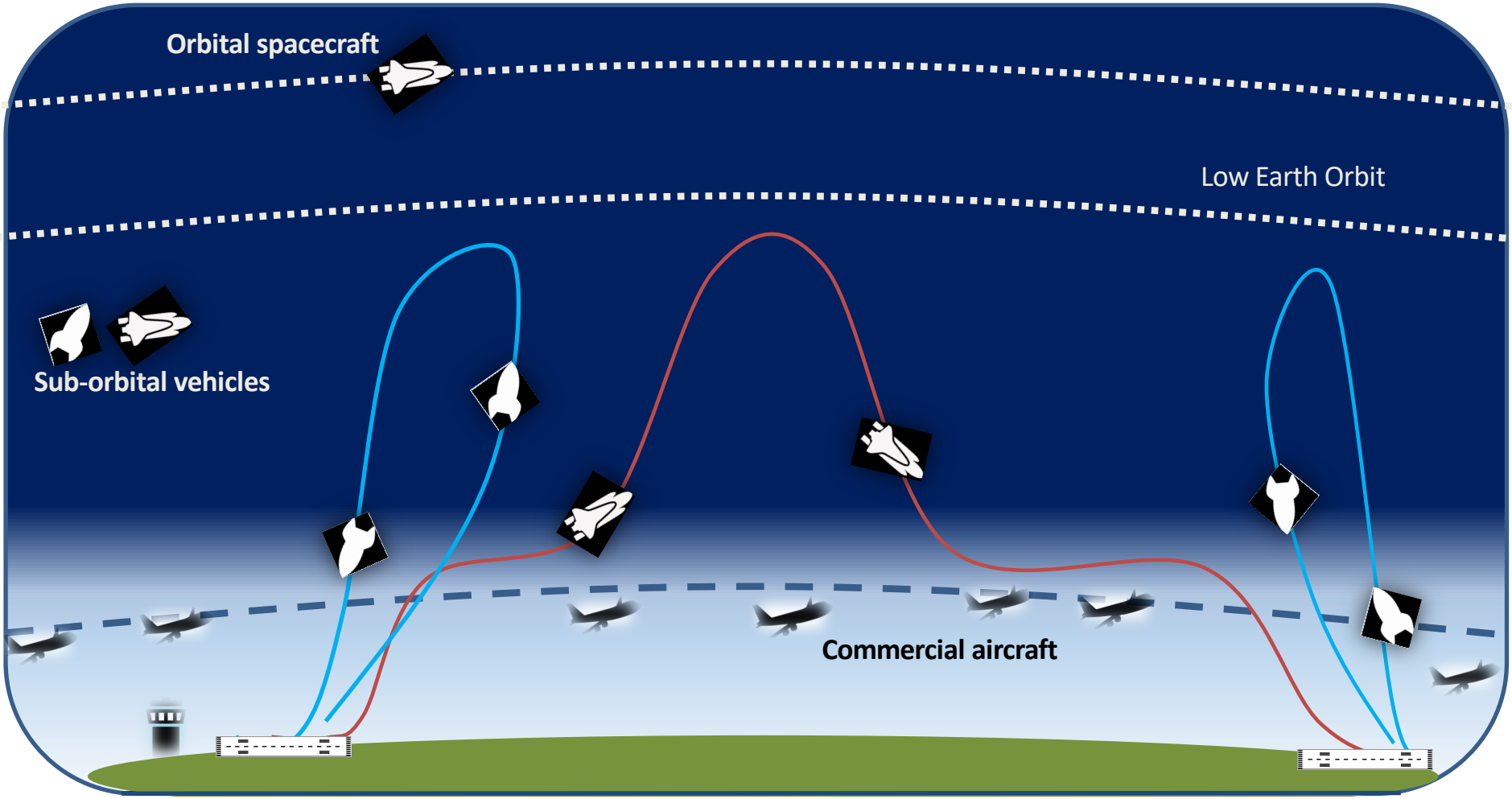
ITU WRC-23 agenda
will be very busy for aviation

1. Spectrum use by sub-orbital vehicles
2. potential facilitation of aeronautical VHF over satellite
3. Finalization of a satellite allocation enabling beyond-line-of-sight C2-link for RPAS



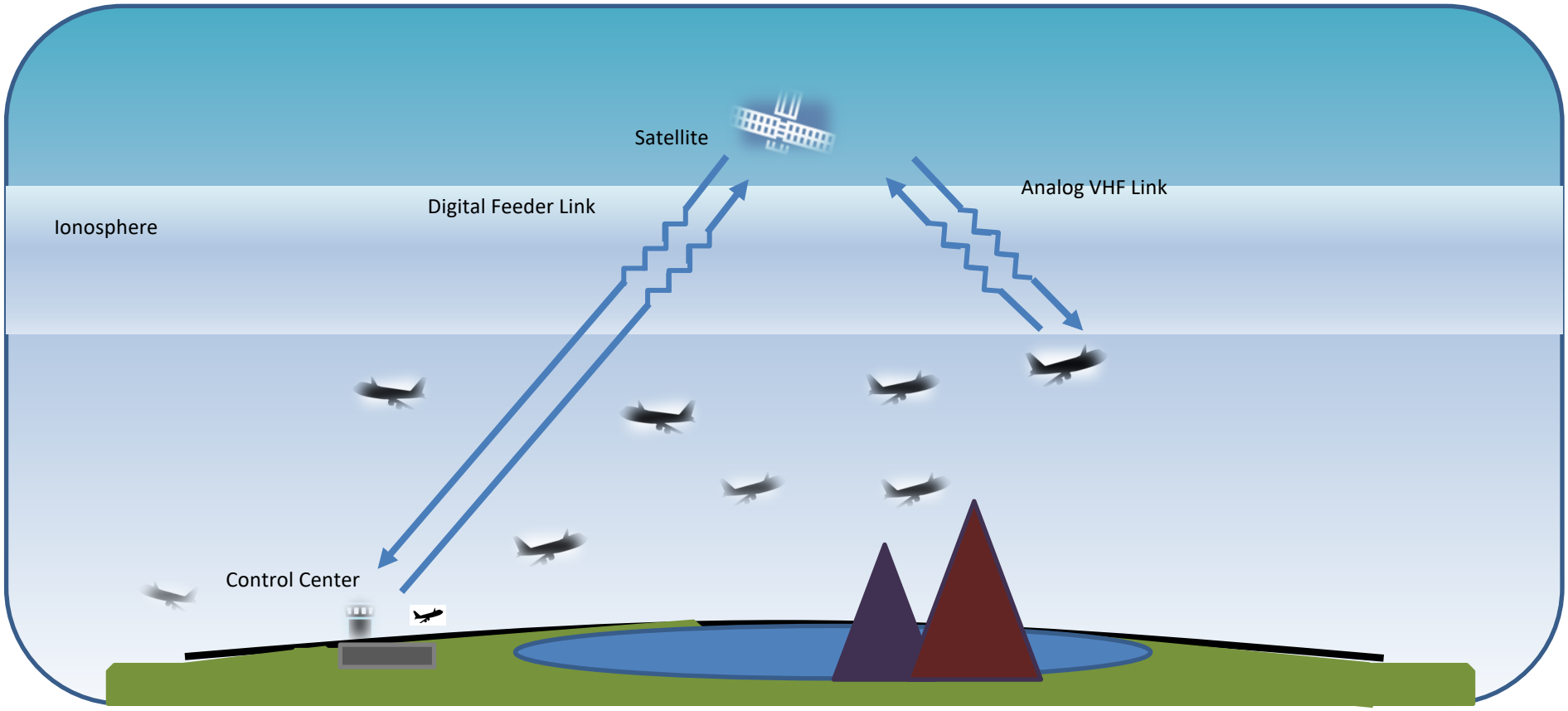
4. Modifications to aeronautical HF, potentially enabling crystal clear and reliable HF voice as well as HF data
5. Potential new non-safety aeronautical mobile service allocations
6. Difficulties or inconsistencies encountered in the application of the Radio Regulations

WRC-23 Agenda Item 1.6: Spectrum use by sub-orbital vehicles



Free images of spacecraft from Pixabay

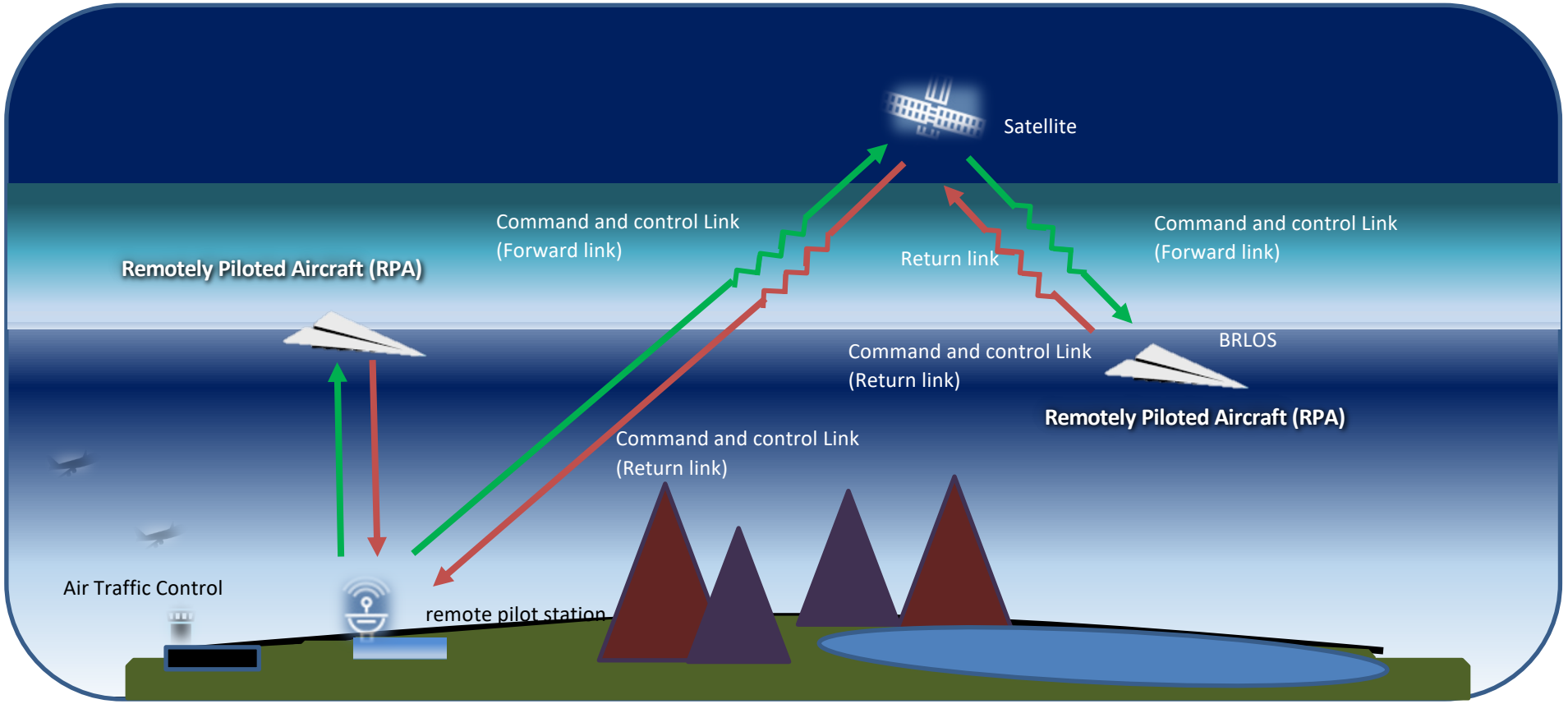
WRC-23 Agenda Item 1.7:
Potential facilitation of aeronautical VHF over satellite



Original image from ICAO CP-DCIWG

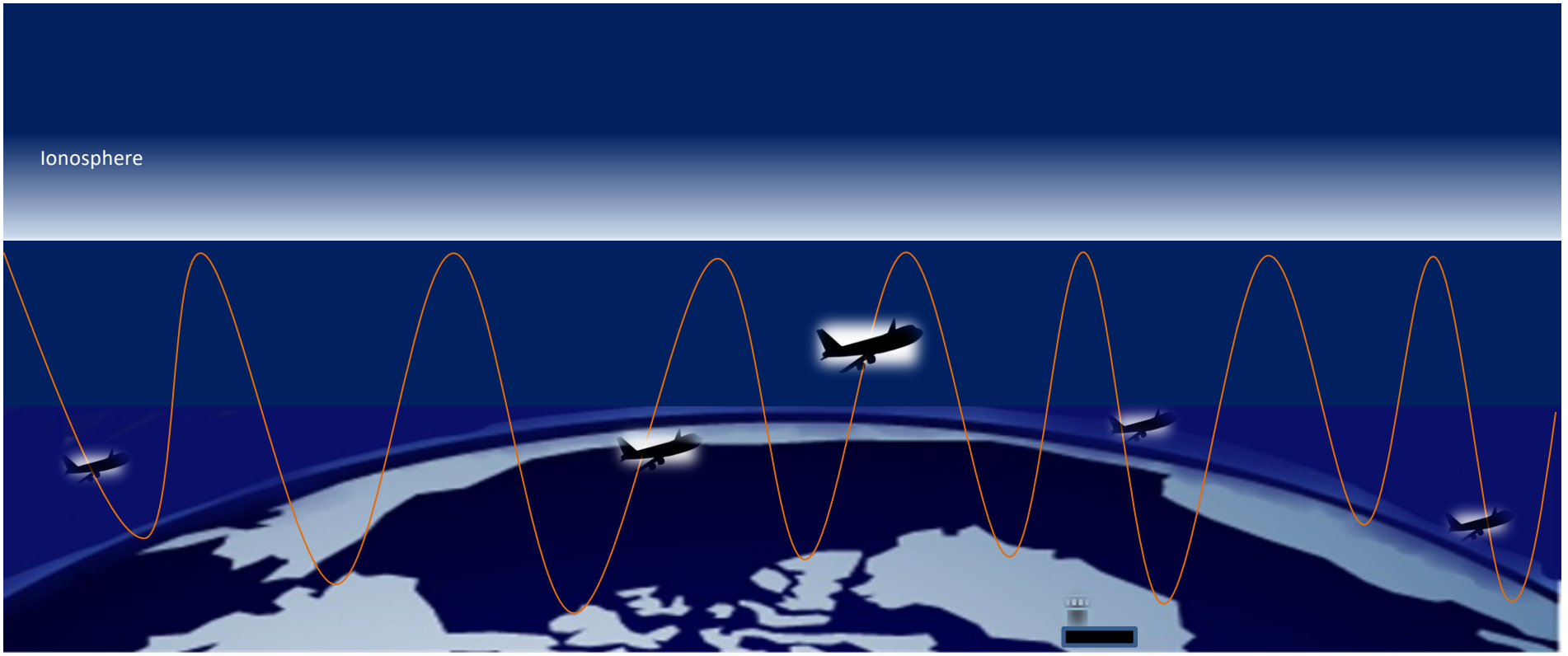
WRC-23 Agenda Item 1.8:

Finalization of a satellite allocation enabling beyond-line-of-sight C2-link for RPAS



WRC-23 Agenda Item 1.9:

Modifications to aeronautical HF, potentially enabling crystal clear and reliable HF voice as well as high speed HF data



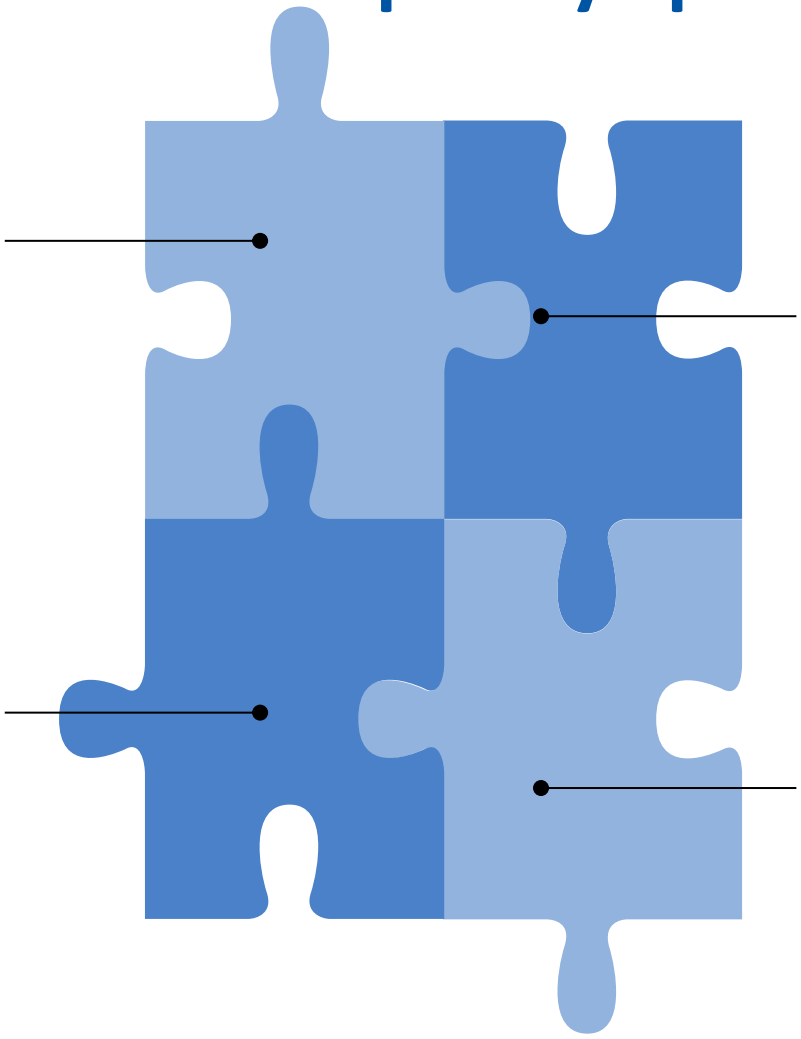
Management and Defence of Aviation Frequency Spectrum

ICAO Frequency Spectrum Strategy

High level vision on existing and future spectrum requirements in support of the evolving CNS systems and infrastructure requirements

ICAO Frequency Policy Statements

Statements of official policy on each and every frequency band used by aeronautical systems for the provision of CNS



ICAO Position for WRC

ICAO Position on the specific agenda items of the upcoming ITU WRC to ensure that aeronautical requirements and safety concerns are met

Strategy for establishing and promoting the ICAO WRC Position

(including Assembly Resolution A38-6)

ICAO Spectrum Strategy

AN-Conf/12 Recommendation 1/12

- timely availability and appropriate protection of adequate spectrum
- create a sustainable environment for growth and technology development to support safety and operational effectiveness for current and future operational systems
- allow for the transition between present and next generation technologies

- demonstrate efficient use of the spectrum allocated through efficient frequency management and use of best practice.

- clearly state in the strategy the need for aeronautical systems to operate in spectrum allocated to an appropriate aeronautical safety service

Develop and implement a comprehensive aviation frequency spectrum strategy to be referenced in the GANP

ICAO Spectrum Policy Statements

- WRC is limited to certain issues and certain frequency bands
- ICAO position only addresses spectrum usage in context with issues identified in the pre-set WRC agenda

The Policy Statements are "Official ICAO Policy" approved by Council

ICAO Policy Statements indicate overall ICAO policy for every frequency band used by aviation safety

The ICAO Policy Statements are contained in Chapter 7 of the Radio Frequency Handbook

Assembly Resolution A38-6

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:*

RESPONSIBLE	Working to deliver efficient aeronautical frequency management and "best practices" to demonstrate the effectiveness and relevance of the aviation industry
ACCOUNTABLE	Supporting ICAO activities relating to the aviation frequency spectrum strategy and policy through relevant meetings and regional planning groups
FULL INTEGRATION	Undertaking to provide for aviation interests to be fully integrated in the development of their positions, to the extent possible, material consistent with the ICAO Position
SUPPORTIVE	Supporting the ICAO position and the ICAO policy 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 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 A38-6

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:

***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*

Long Term Evolution of CNS and Spectrum matters

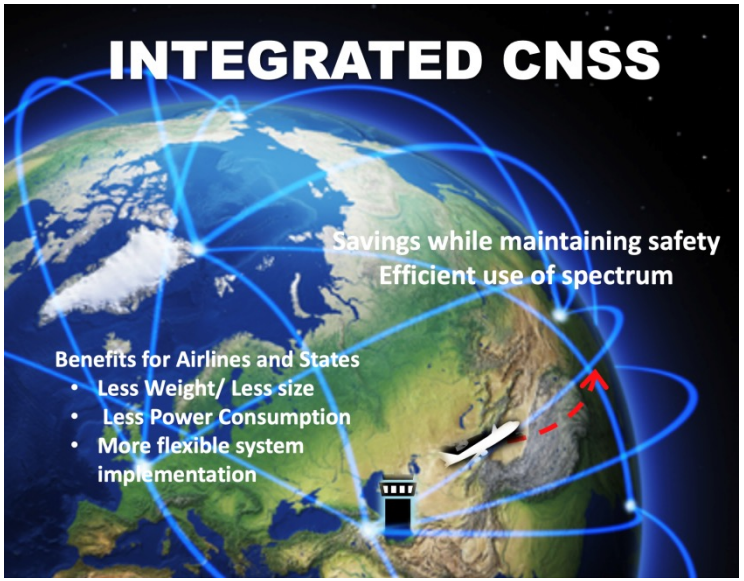
In addition to the continued engagement in the ITU spectrum management process, aviation also needs to engage in a proactive and long-term evolution of the CNS systems

AN-Conf/13 Recommendation 2.2/1

- ICAO to launch a study on evolving the required CNS and spectrum access strategy in the long term, to ensure that CNS systems remain efficient users of the spectrum resource

- request States to engage in the spectrum regulatory process to ensure the continued necessary access and protection of the safety critical aeronautical CNS systems

Work is being initiated to undertake this study. This activity is expected to benefit the development of aeronautical CNS systems and their spectrum use in the medium to longer term and eventually the formulation of the ICAO spectrum policy for future WRCs



Current status of work

- WRC-23 preparations are on-track, as per the instructions given in Assembly Resolution 38-6
- Position for WRC-23 was developed by FSMP, agreed by the Air Navigation Commission and approved by ICAO Council in June 2021.
- ITU-R studies are supported by ICAO Secretariat
- A new task has been initiated in coordination with ANC, looking into the long-term evolution of CNS and spectrum matters, as per AN-Conf/13 Recommendation 2/2.1:
  - ✓ Initially this task is being progressed using a small informal taskforce, consisting of select industry representatives, CNS panel participants and Secretariat.
  - ✓ Taskforce is foreseen to be taken over by ANC. Study will be introduced at 41st Assembly.

Questions

More information:

Frequency Spectrum Management Panel (FSMP)

https://www.icao.int/safety/FSMP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ICAO

THANK YOU!