

2023 World Radiocommunication Conference Agenda Item 1.7

Space based VHF

AMS(R)S allocation in 117.975-137 MHz band

Regional Preparatory Group Meeting
28-29 Aug 2023



Background



- Air navigation services limited by line-of-sight coverage of terrestrial systems
- Constrained by separation procedures between aircraft in oceanic and remote areas
- Reduced airspace capacity and efficiency

Objective

- VHF communications relay via satellite in oceanic and remote airspace
- Complement current aviation use of satellite-based navigation and surveillance technologies
- Ease implementation with no change in aircraft avionic equipment
- Minimal or no change to current operations and SARPs
- Backup terrestrial systems

WRC-23 Agenda Item 1.7 – Resolution 428 (on space-based VHF)

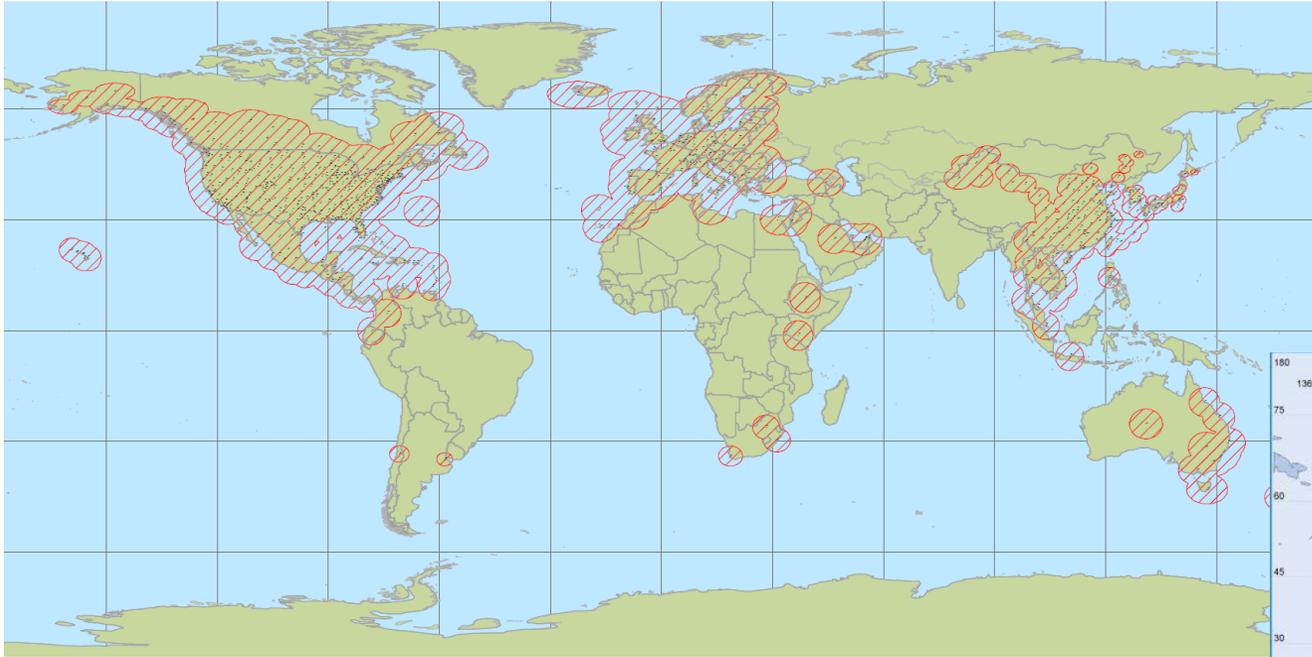
**resolves to invite the
ITU
Radiocommunication
Sector**

- to define the relevant technical characteristics
- to study compatibility in Earth-to-space and space-to-Earth directions
- with existing primary services in-band & adjacent bands
- ensuring protection of systems using these services
- not constraining planned usage of those systems;
- taking into consideration the responsibility of ICAO;

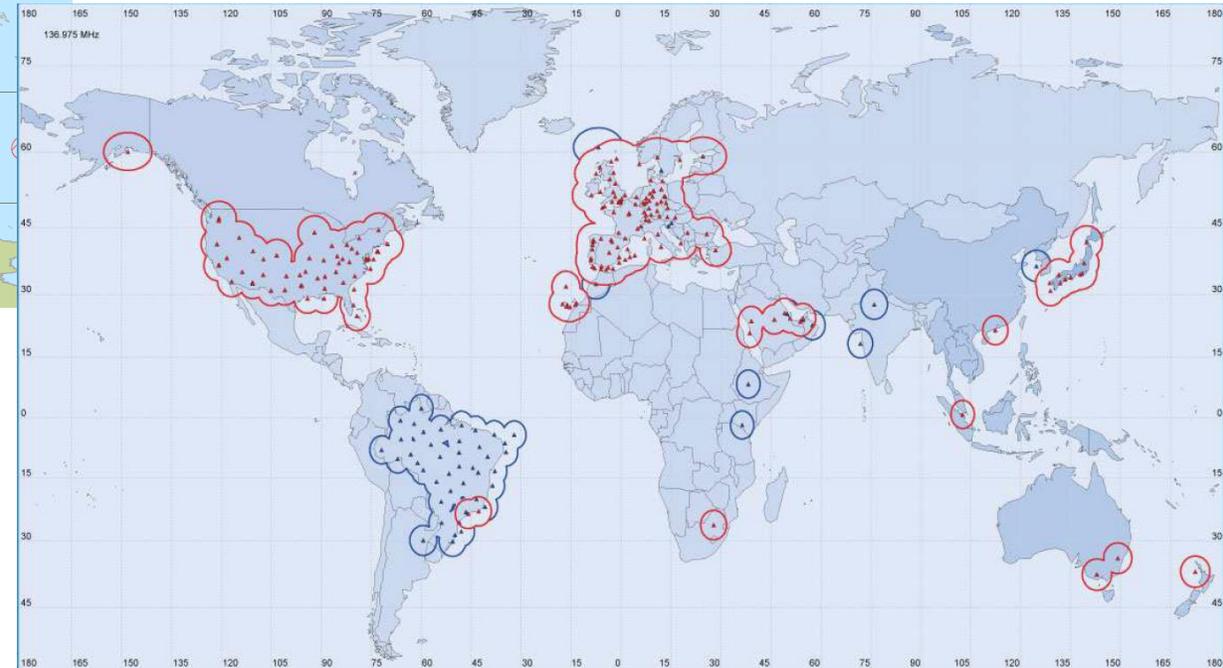
**invites the
International Civil
Aviation
Organization**

- to provide aeronautical operational requirements and relevant available technical characteristics
- to take into account the sharing and compatibility conclusions at ITU-R in the SARPs to be developed for AMS(R)S

Oceanic and Remote Areas have limited CNS* infrastructure, which conditions Separation Standards – i.e. Lack of global VDLM2 coverage based on ground stations



COLLINS

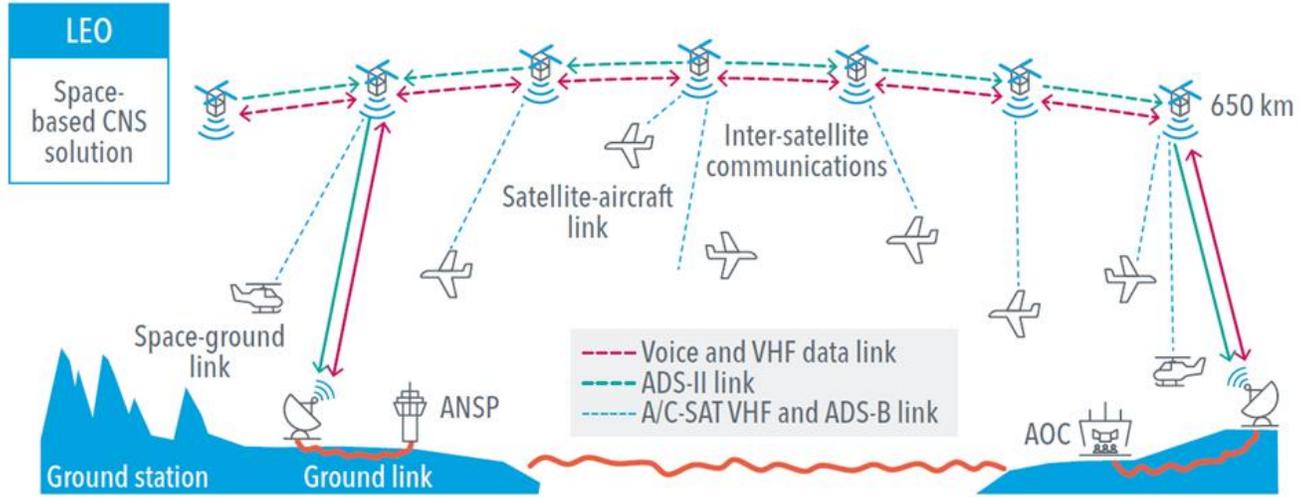


SITA

* CNS: Communications, Navigation and Surveillance

HOW IT WORKS?

Satellite-based VHF potential



✓ ATS data comms

CPDLC & ADS-C services

✓ VHF voice

Controller-pilot voice communications

✓ ADS-B

Secure triangulated ADS-B signals

✓ AOC

Provision of AOC data

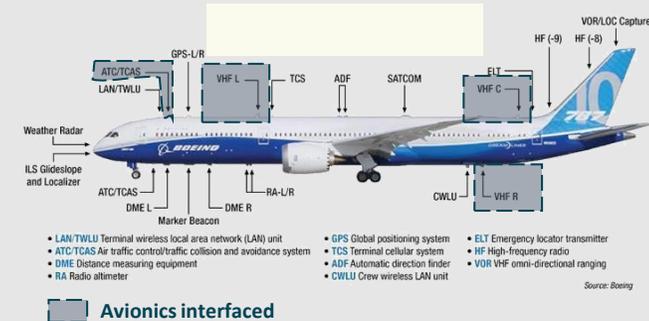
✓ No retrofitting

Does not require any modifications to existing aircraft systems

ATM Air traffic management
 ADS-B Automatic dependent surveillance–broadcast
 TBO Trajectory-based operations
 LEO Low Earth orbit
 CNS Communication navigation surveillance

ANSP Air navigation service provider
 AOC Airline operational communications
 CPDLC Controller pilot data link communication
 ADS-C Automatic dependent surveillance contract

AIRCRAFT WILL NOT NEED ANY ADDITIONAL AVIONICS EQUIPMENT

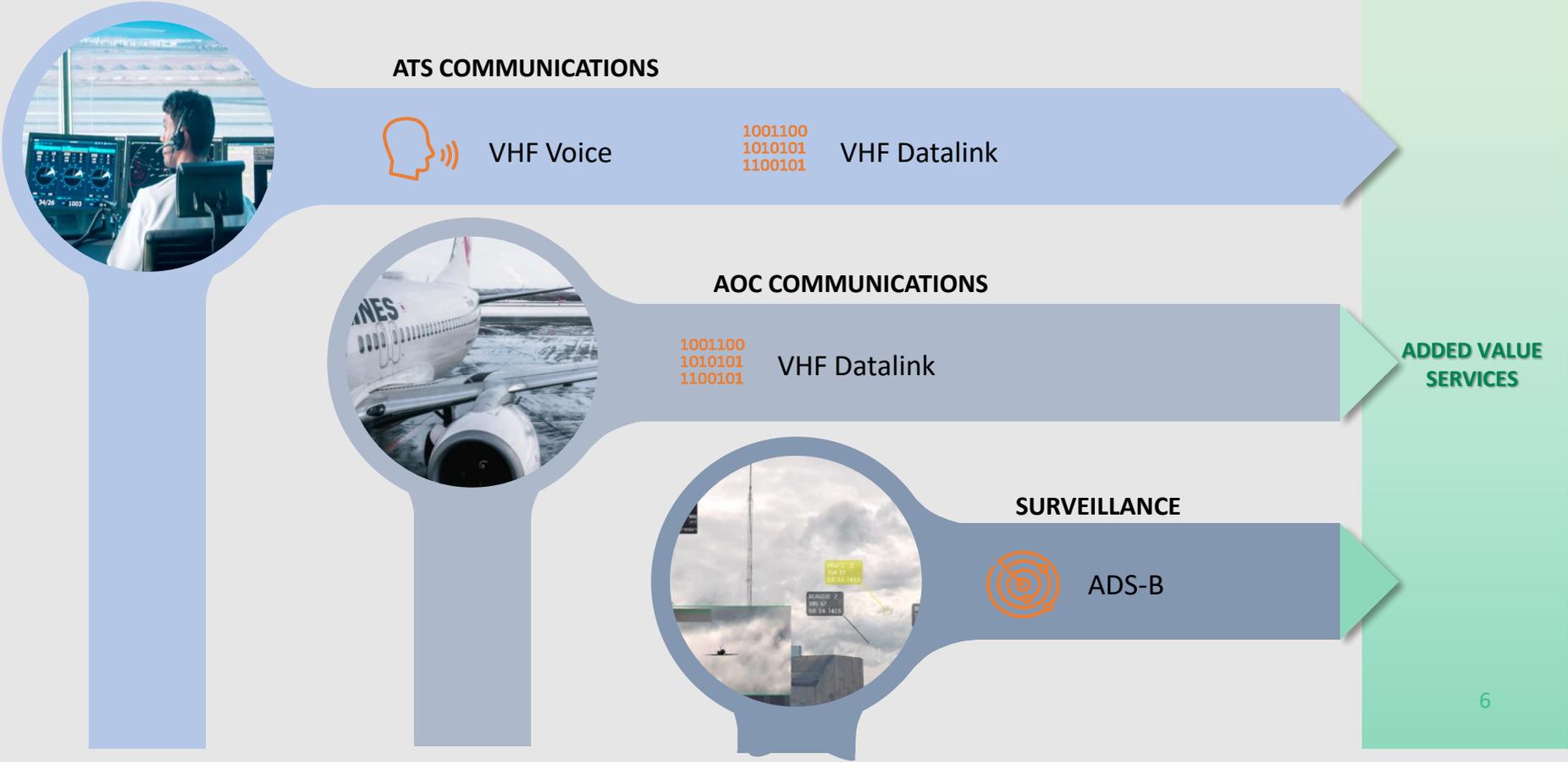


ATCOs/PILOTS WILL NOT NEED ANY NEW TRAINING AND VHF DATA WILL BE PROCESSED AS USUAL BY ATC SYSTEMS



SB-VHF Service providers will operate a constellation fully designed and developed for ATM purposes which will translate into controlled costs.

SB-VHF CONCEPT ENABLES AERONAUTICAL COM & SUR SERVICES FROM SPACE



ATS: Air Traffic Services (used by Air Navigation Services Providers)

AOC: Aeronautical Operational Control (used by Airlines)

Operational procedures based on new datalink services

- The **complementary use of VHF voice and VHF data** (CPDLC and ADS-C) with surveillance information through ADS-B will facilitate the introduction of functionalities such as **Trajectory Based Operations (TBO), Free Route Airspace (FRA) and 4D Trajectory Datalink (4DTRAD)** in oceanic and remote continental airspace.
- Today, all these concepts are applicable to the continental areas by virtue of the communication systems available (datalink using CPDLC and ADS-C) that support them. These concepts are however **also applicable to remote and oceanic areas** when the enabling technology, as SB-VHF, is available.
- In the short-term future, **Datalink is becoming more and more essential and SB-VHF concept allows a quick and homogeneous deployment of datalink services** in all oceanic and remote continental areas.
- Datalink services are working in the frequency band 136-137 MHz being the most important **VDLM2 CSC channel in the 136,975 MHz frequency**.

Summary of operational ATM benefits from the SB-VHF concept

- Use of the **same operational procedures** as in continental areas.
- **No need of additional equipment** on board at the aircraft. No impact in current avionics.
- Significant **increase of safety** in the aircraft operation since full CNS services will be provided to the aircraft.
- Significant **increase in capacity** in oceanic and remote continental areas.
- **Neither additional training for crew nor for ATCOs is required**, as operation is the same as in continental areas.

Why AMS(R)S is critical for ANSPs and Airlines

- Current lack of air traffic control infrastructure based on ground systems will need billions USD investment during decades to update.
- AMS(R)S will reduce CAPEX investment and will bring homogeneity air traffic control capabilities throughout all ICAO Regions.
- AMS(R)S will not require change of current avionics equipment on board aircraft. No new equipment required. All aircraft are already equipped for operation with AM(R)S (!)
- The introduction of AMS(R)S in different ICAO Regions will allow exploitation of air traffic to same level in all the world minimizing differences between different ICAO Regions, helping the economical and social development of all ICAO Regions.
- Countries may consider supporting the primary allocation to Aeronautical Mobile Satellite (On route) Service in the whole band 117.975 – 137 MHz, allowing both voice and data link communications.

Preliminary Draft New Report (PDNR) ITU-R M.[SPACE-VHF]

Summary of technical & operational studies



Aircraft VHF radio

Doppler shift and latency

Ionospheric scintillation

Polarization (Circular)

Satellite-aircraft range

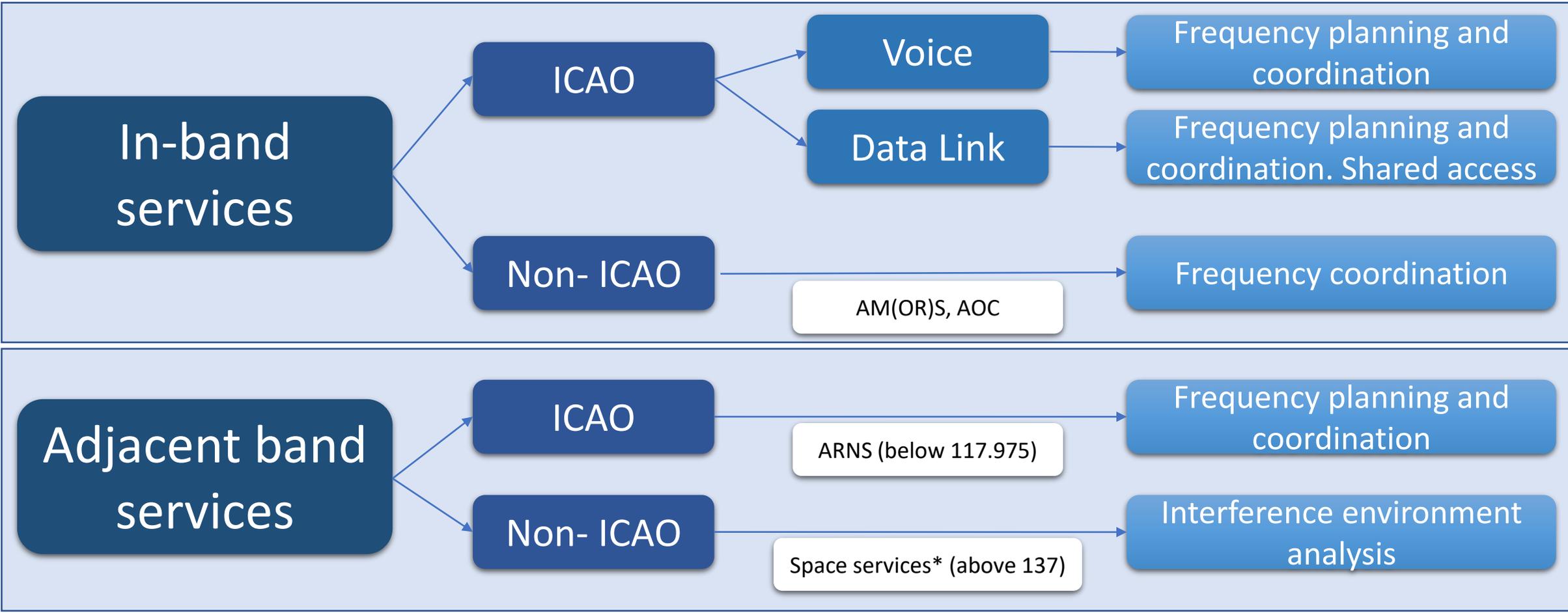
Payload antenna

Baseline link budgets

Feasible solution found using low-Earth orbit satellite

Preliminary Draft New Report (PDNR) ITU-R M.[SPACE-VHF]

Coexistence and Compatibility



* Space services in the band 137-138 MHz consist of Space Operation, Meteorological, Space Research and Mobile Satellite Services

Development of ITU studies

1. ITU-R has studied the **architecture, parameters**, and baseline **link budgets** of a reference AMS(R)S system for the provision of standardized communications for air traffic management, **without modification to aircraft equipment**.
2. To support compatibility studies, examples of the link budgets for **satellite-to-aircraft** (downlink) and **aircraft-to-satellite** (uplink) VHF links have been developed, based on propagation considerations adopted by ITU-R.
3. Compatibility studies of new AMS(R)S with existing primary services operating in-band/adjacent bands have been conducted with inputs from the relevant ITU-R Working Parties to **ensure the protection of existing systems from possible interference** resulting from the introduction of a **new AMS(R)S**.
4. Analysis of the results of studies has been divided into five sub-sections as follows:
 - In-band sharing between the systems operating in the **AMS(R)S** and **AM(R)S**
 - Adjacent band compatibility between AMS(R)S **above 117.975 MHz** & ARNS **below 117.975 MHz**
 - Adjacent band compatibility with systems operating **above 137MHz**
 - Interference from AMS(R)S into adjacent band services
 - Interference from adjacent band services space stations into space receivers of the AMS(R)S
 - **In-band** sharing with **other services**
 - Compatibility between systems operating in the AMS(R)S from **different Administrations**

Draft Conference Preparatory Meeting (CPM) Text for WRC-23 Agenda Item 1.7

Proposed Methods

➤ Method A: NOC

➤ Method B:

➤ All B methods have in common to be in favour of a new allocation to the AMS(R)S, limited to non-geostationary satellite systems and to internationally standardized aeronautical systems, with a limit for coordination threshold in the Appendix 5. They differ in the technical and regulatory considerations associated to this allocation:

	Method B1	Method B2	Method B3	Method B4
Frequency range (MHz)	117.975 – 137	117.975 – 137	117.975 – 136.8	117.975 – 136
Coordination	RR No. 9.11A	RR No. 9.11 A (excluding 9.16)	RR No. 9.11 A	
WRC Resolution	No	No	New Resolution	No
Impact	Voice and data link are possible. Certainty of deployment for both AMS(R)S and AM(R)S.	Voice and data link are possible. Uncertainties on future coordination of AMS(R)S and AM(R)S.	Voice is possible. Data link practically excluded. Uncertain scope of the Resolution still to be developed.	Voice is possible. Data link totally excluded. Incomplete method.

Updated ICAO Position for the ITU WRC-23



ICAO Council, at the third meeting of its 229th Session, held on 16 June 2023, approved updates to the ICAO Position on issues of critical concern to aviation and authorized their transmission to ICAO Member States:

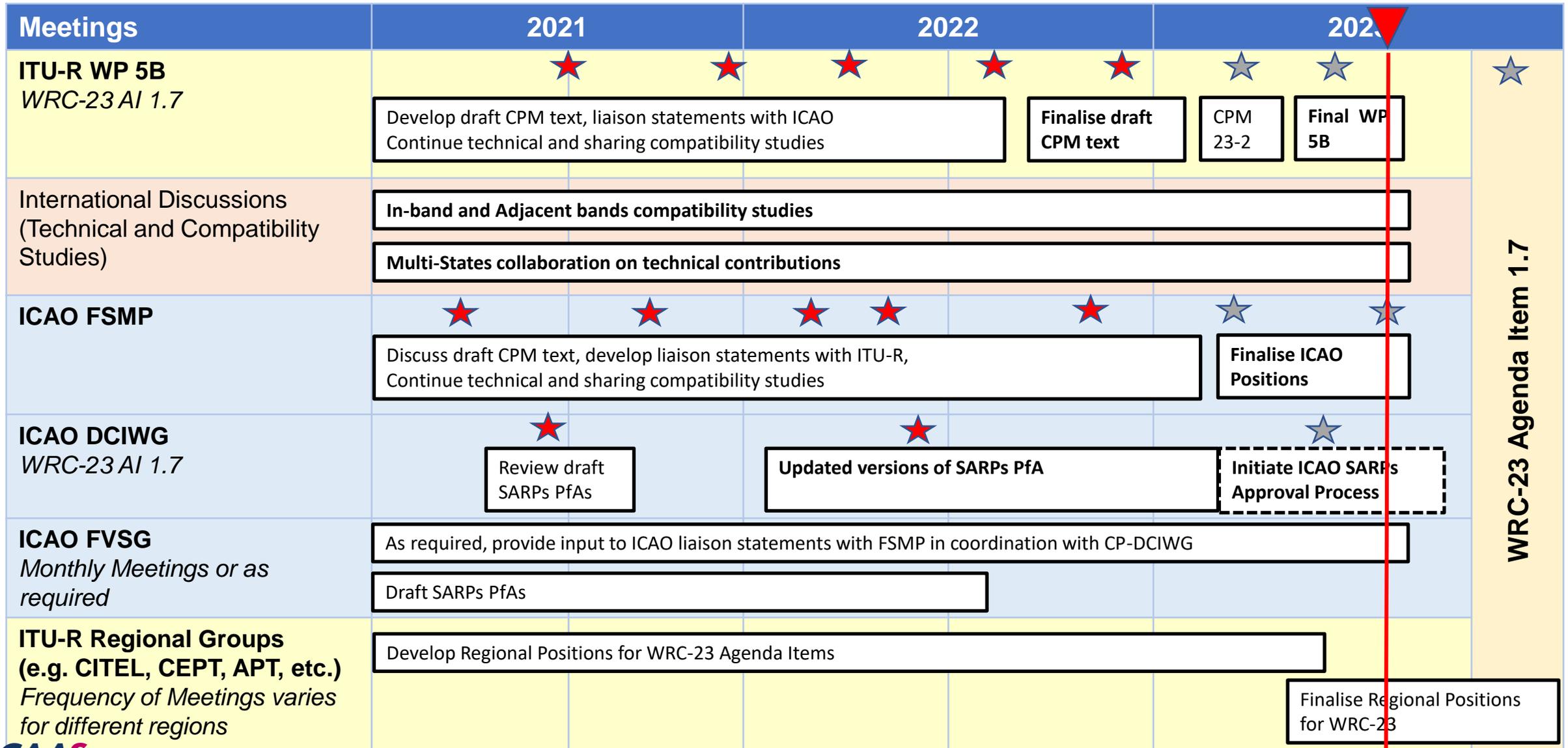
- **Agenda item 1.7 title:** To consider a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation in accordance with Resolution 428 (WRC-19) for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands.
- **ICAO position on Agenda item 1.7:** To support a global primary allocation to the aeronautical mobile-satellite (route) service for both the Earth-to-space and space-to-Earth directions in all or part of the frequency band 117.975-137 MHz subject to the following conditions:
 - the use of any new AMS(R)S allocation be limited to aeronautical VHF communications for safety and regularity of flight.
 - ensure the protection of existing primary terrestrial aeronautical systems in the 117.975-137 MHz band, and not constrain the planned usage of those systems.

The systems shall be planned, implemented and operated in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

An aerial photograph of an airport terminal and control tower at dusk. The control tower is a tall, white, cylindrical structure with a glass-enclosed observation deck and a golden dome on top. The terminal building is a large, modern structure with a glass facade and a curved roof. The sky is a mix of blue and orange, with a few clouds. A small airplane is visible in the sky, leaving a white contrail. The foreground shows a road with cars and some greenery.

Thank you

Regulatory activities at ICAO and ITU



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