2023 World Radiocommunication Conference Agenda Item 1.7

Space based VHF

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

Preparatory Workshop to ITU WRC-23
21-22 February 2022

CAA Singapore

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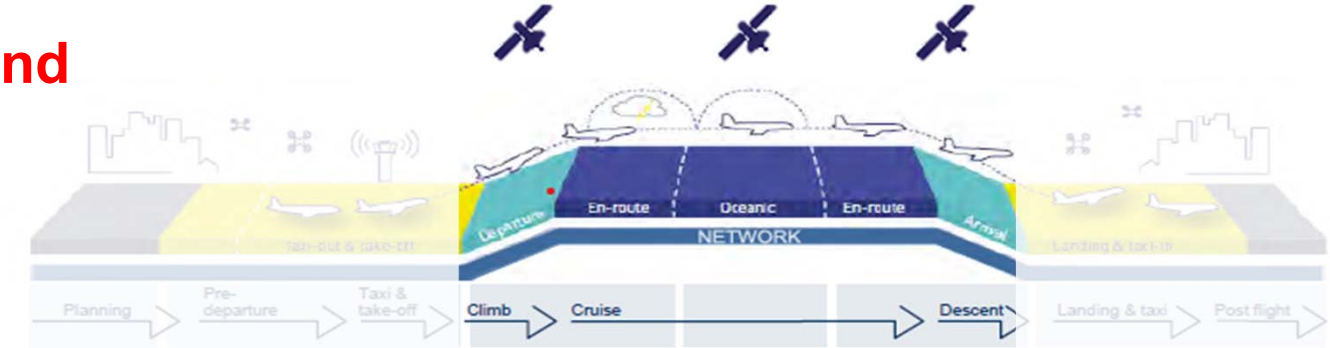
Background



- 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

Agenda Item 1.7 – Resolution 428

resolves to invite the ITU Radiocommunication Sector	• to define the relevant technical characteristics	Completed
	• to study compatibility	Mostly Completed
	• Earth-to-space and space-to-Earth directions	Completed
	• existing primary services in band and in adjacent bands	Completed
	• ensuring protection of systems using existing primary services	Completed
	• not constraining planned usage of those systems;	Completed
	• taking into consideration the responsibility of ICAO;	Completed
invites the International Civil Aviation Organization	• to provide aeronautical operational requirements and relevant available technical characteristics	In progress
	• to take into account the sharing and compatibility conclusions at ITU-R in the SARPs to be developed for AMS(R)S	In progress

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ICAO's Position

- To support ITU-R studies and the definition of relevant technical characteristics as called for by Resolution 428 (WRC-19).

- To support a global allocation to the aeronautical mobile-satellite (route) service for both the Earth-to-space and space-to-Earth directions in the frequency band 117.975-137 MHz and that the use of the allocation be limited to the relaying of aeronautical VHF air traffic management communications.

- To support that those systems shall operate in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

- To ensure that any change to the regulatory provisions and spectrum allocation resulting from this agenda item do not adversely impact the operation of existing VHF systems in the band 117.975-137 MHz operating in the AM(R)S, including regional usage of terrestrial VHF, nor require any changes to aircraft equipage or to existing installations.

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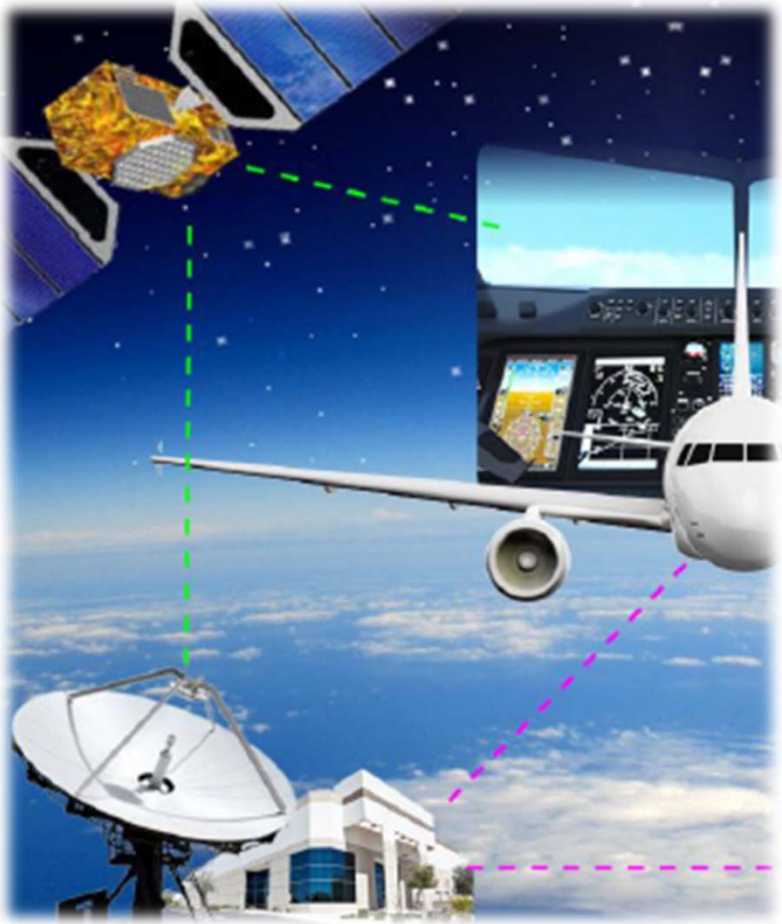
WD towards a PDN Report ITU-R M.[SPACE-VHF]

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

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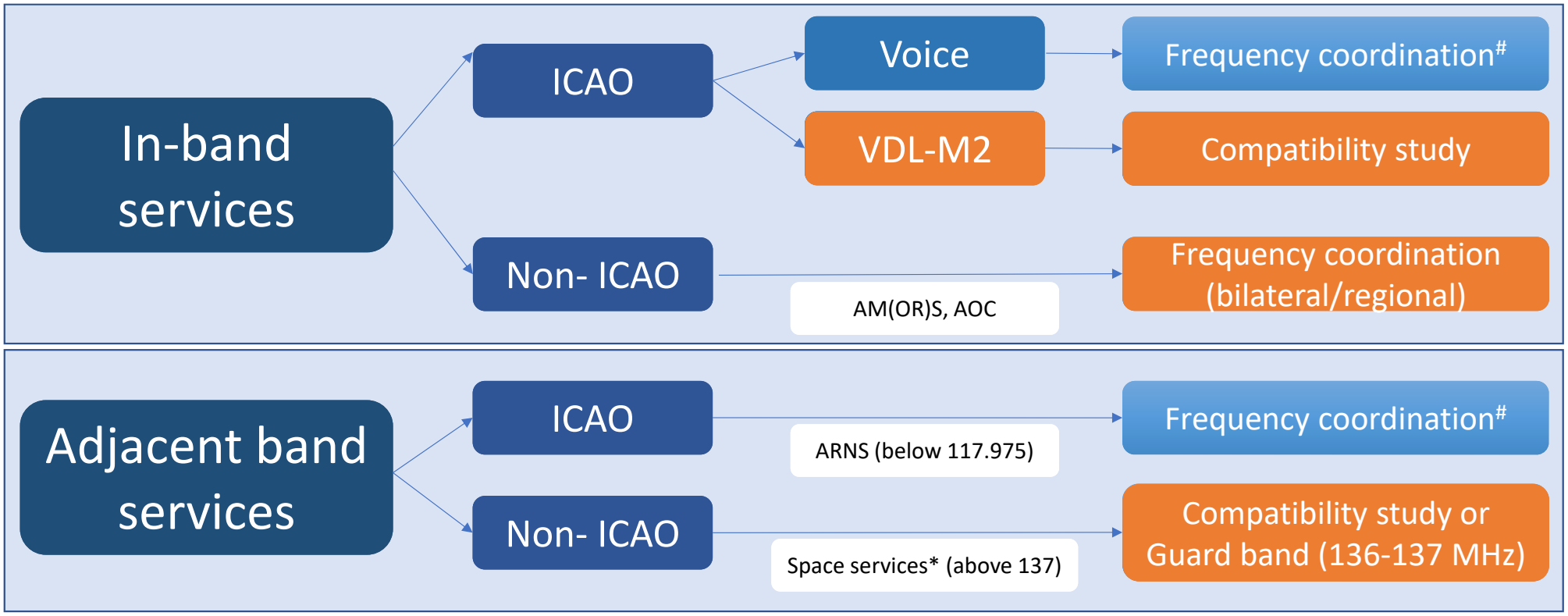
WD towards a PDN Report ITU-R M.[SPACE-VHF]

Coexistent and Compatibility



Responsibility of ICAO

* Services in 137-138 MHz such as Space Operation, Meteorological satellite, Space Research, Mobile Satellite

Pending discussions and acceptance of studies

WD towards a Draft CPM Text for WRC-23 Agenda Item 1.7

Current Proposed Methods

Method A – “No Change” to the Radio Regulation i.e. frequency allocation **NOT** granted.

New AMS(R)S allocation in the band:

Method B	Method C	Method D
117.975-136 MHz	**117.975-[136/137] MHz**	**117.975-137 MHz**
• Limited to internationally standardized aeronautical systems	• Limited to systems that operate in accordance to international SARPs and procedures established in accordance with the Convention on International Civil Aviation	• Limited to internationally standardized aeronautical systems; and • Limit the maximum power flux density radiated over the Earth above 137 MHz to [-197.7 dB(W/(m^2 · Hz))]

*Further discussions are ongoing towards possible reconciliation of Methods B, C and D into a single method, depending on the results of the technical compatibility studies.

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Summary

- WP 5B has progressed in its studies and has amended its working document, taking into account all material provided by ICAO.

- Currently the AMS(R)S allocations are being considered separately:
  - **117.975-136 MHz** (voice application, and possibly data link under DSB AM modulation in accordance with SARPs with identical RF parameters)
  - **136-137 MHz** (voice and VDL Mode 2 applications)

- Pending confirmation of the representativeness of the parameters against international standardized system for VDL Mode 2, and further discussion required on information regarding protection criterion of adjacent space services.

- Next WP5 meeting to be held in Mar/Apr 2022.

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Questions?

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Regulatory activities at ICAO and ITU

Meetings	2021	2022	2023
ITU-R WP 5B *WRC-23 AI 1.7*	Develop draft CPM text, liaison statements with ICAO Continue technical and sharing compatibility studies	**Finalise draft CPM text**	CPM 23-2 **Final WP 5B**
International Discussions (Technical and Compatibility Studies)	**In-band and Adjacent bands compatibility studies** **Multi-States collaboration on technical contributions**		
ICAO FSMP	Discuss draft CPM text, develop liaison statements with ITU-R, Continue technical and sharing compatibility studies		**Finalise ICAO Positions**
ICAO DCIWG *WRC-23 AI 1.7*	Review draft SARPs PfAs	**Review a matured version of SARPs PfA**	**Initiate ICAO SARPs Approval Process**
ICAO FVSG *Monthly Meetings or as required*	As required, provide input to ICAO liaison statements with FSMP in coordination with CP-DCIWG Draft SARPs PfAs		
ITU-R Regional Groups (e.g. CITEL, CEPT, APT, etc.) *Frequency of Meetings varies for different regions*	Develop Regional Positions for WRC-23 Agenda Items		Finalise Regional Positions for WRC-23

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Tentative Meeting

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