

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
13-14 Feb 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**

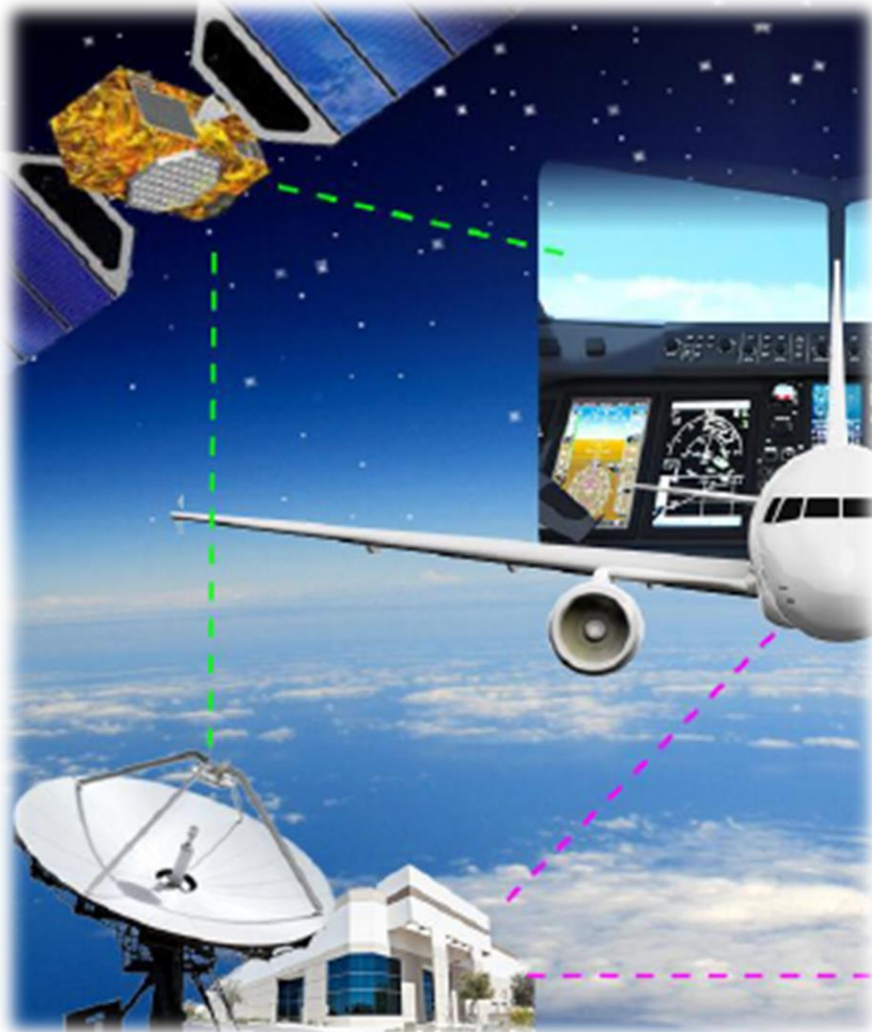
- to define the relevant technical characteristics
- to study compatibility in Earth-to-space and space-to-Earth directions
- with existing primary services in-band & adjacent bands
- ensuring protection of systems using these services
- not constraining planned usage of those systems;
- taking into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

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

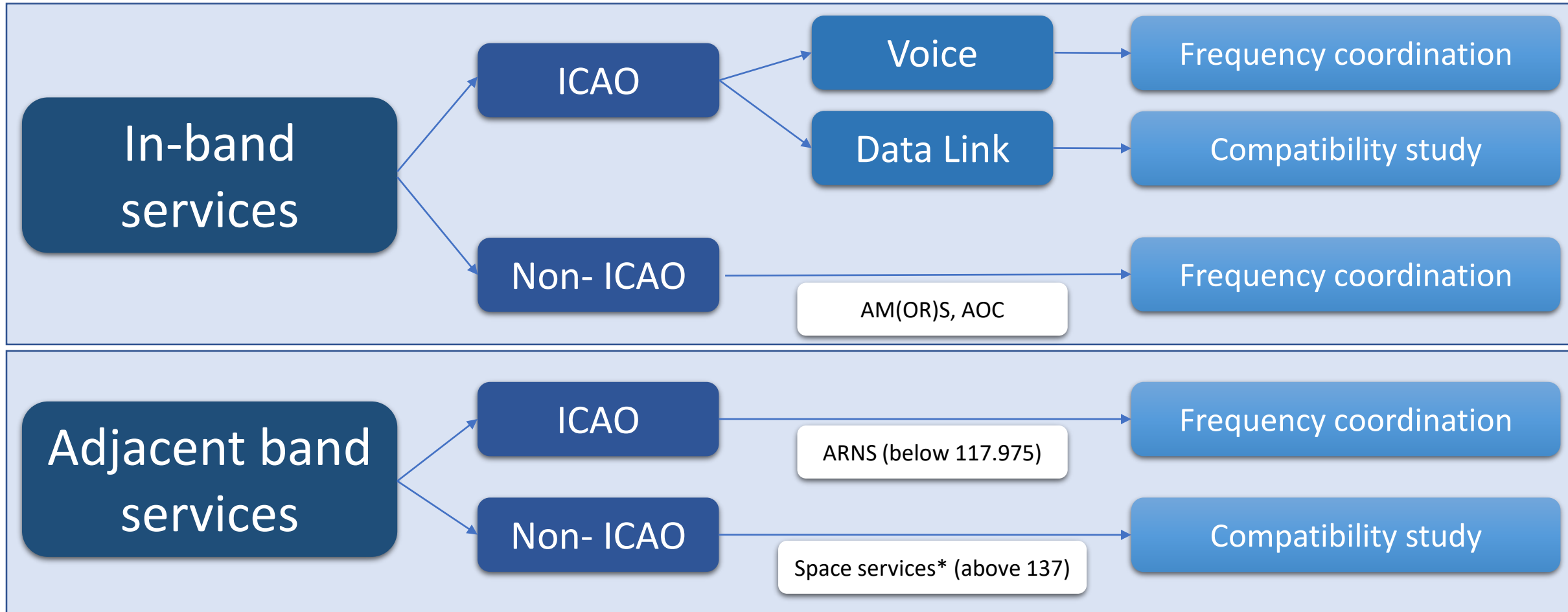
Payload antenna

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**
 - **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 | No change to the Radio Regulations |
| Method B | <p>New allocation to the AMS(R)S within the frequency band 117.975-137 MHz</p> <ul style="list-style-type: none"> Limited to non-geostationary satellite systems only Limited to internationally standardised aeronautical systems <p><i>(Method B is not an independent and standalone Method, should be considered together with Methods B1 or B2)</i></p> |
| Method B1 | <ul style="list-style-type: none"> Ensure protection of AM(OR)S service in the frequency band 132-137 MHz through frequency planning/coordination Ensure protection of services in adjacent bands and not constraining these services Ensure coexistence of In-band AM(R)S and adjacent-band ARNS below 117.975 MHz through frequency planning/coordination Ensure protection of adjacent band services operating above 137 MHz <ul style="list-style-type: none"> 1 MHz guard band in 136-137 MHz¹ limit of satellite pfd of -166.6 dB(W/(m² · 14 kHz)) on the level of unwanted emissions above 137 MHz for AMS(R)S emissions from systems operating in 136-137 MHz |
| Method B2 | <ul style="list-style-type: none"> Apply RR No. 9.11A coordination procedures (including RR No. 9.14) for AMS(R)S systems Apply coordination threshold (-140 dB(W/(m² at 4 kHz)) at the Earth's surface for AMS(R)S space stations Adopt restrictions on unwanted emissions from AMS(R)S space stations with limits not worse than those specified in ICAO SARPs for AM(R)S aircraft transmitting stations in adjacent channels Not claim protection from interference from AM(R)S and AM(OR)S systems operating in band, as well as from ARNS, MSS (space-Earth), SOS (space-to-Earth), SRS (space-to-Earth) and MetSat (space-to-Earth) operating in adjacent bands Protect the radio astronomy service in the frequency band 150.05-153 MHz |

¹ RR Appendix 3 provides appropriate limits for spurious emissions for AMS(R)S systems operating in 117.95-136 MHz



Draft ICAO Position and Recommendation



Approved by the Council on 14 June 2021

- 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 equipment or to existing installations.

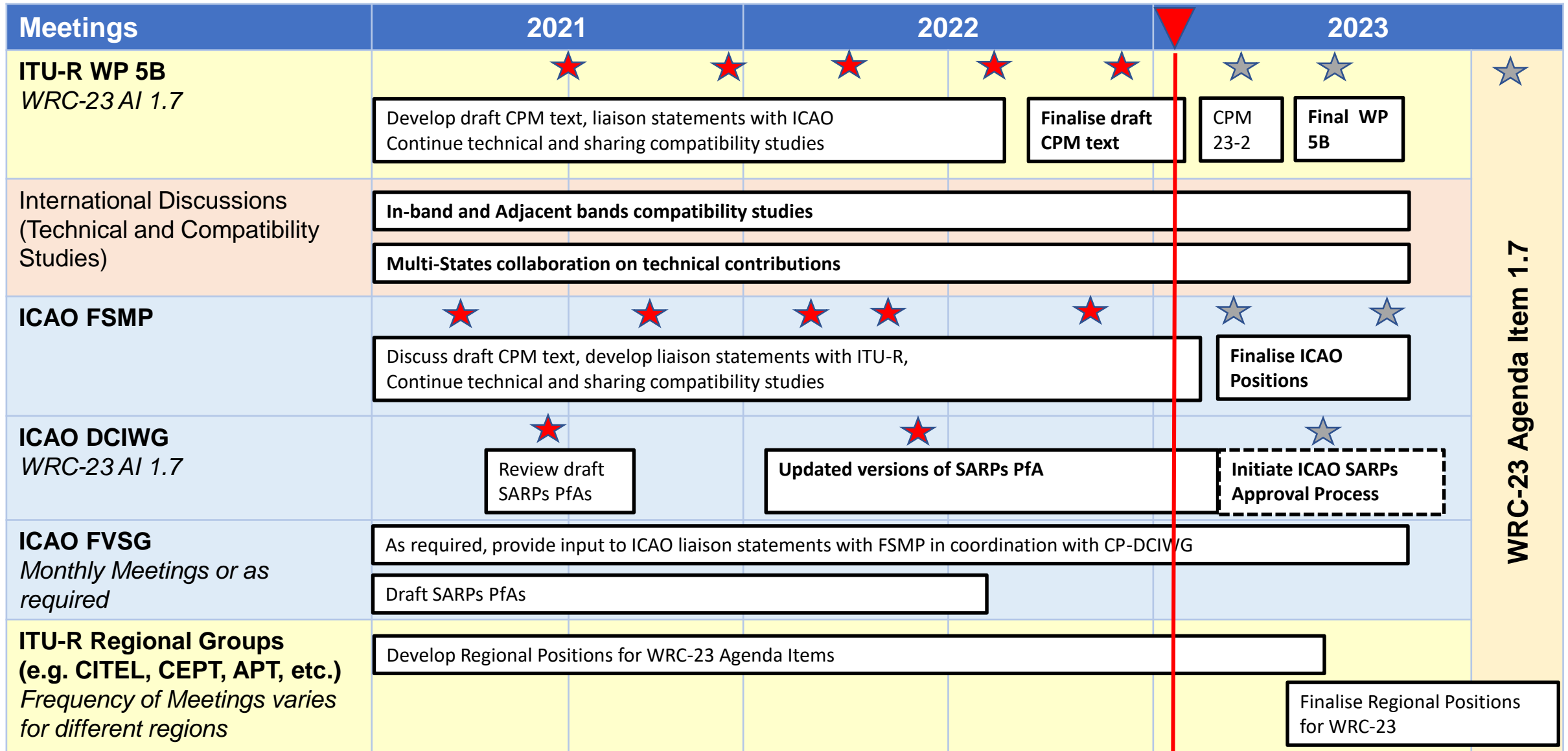
Recommendation

- **To participate in the national preparatory meetings as well as the ITU Regional Groups for WRC and to convince the national telecom regulators to support Method B1**



Thank you

Regulatory activities at ICAO and ITU



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