2019 World Radiocommunication Conference
Agenda Item 1.6

Sub-Orbital Vehicles

To consider, in accordance with Resolution 772 (WRC-19), regulatory provisions to facilitate radiocommunications for sub-orbital vehicles

ICAO Regional Preparatory Group meeting

28-29 August 2023

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Resolution 772 (WRC-19)

Consideration of regulatory provisions to facilitate the introduction of sub orbital vehicles.

Resolves to invite the ITU Radiocommunication Sector

1 to study spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations providing functions such as, , voice/data communications, navigation, surveillance and TT&C;

2 to study appropriate modification, if any, to the Radio Regulations, excluding any new allocations or changes to the existing allocations in Article 5, to accommodate stations on board suborbital vehicles, whilst avoiding any impact on conventional space launch systems, with the following objectives:

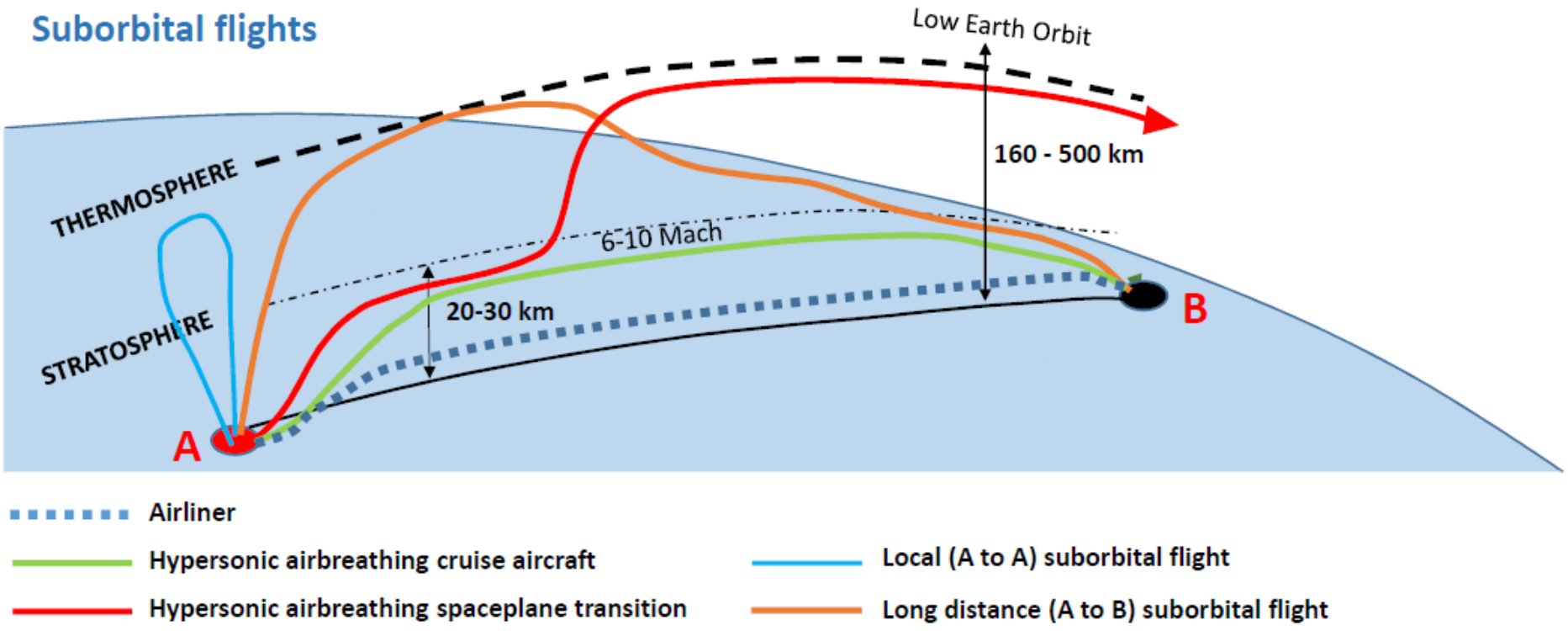
- to determine the status of stations on sub-orbital vehicles, and study corresponding regulatory provisions to determine which existing radiocommunication services can be sed by stations on sub-orbital vehicles, if necessary;
- to determine the technical and regulatory conditions to allow some stations on board suborbital vehicles to operate under the aeronautical regulation and to be considered as earth stations or terrestrial stations even if a part of the flight occurs in space;

Resolution 772 (WRC-19) Continued

- to facilitate radiocommunications that support aviation to safely integrate sub-orbital vehicles into airspace and ensure interoperability with international civil aviation; to define the relevant technical characteristics and protection criteria for the studies to be undertaken in accordance with the bullet point below;
- to conduct sharing and compatibility studies with incumbent services that are allocated on primary basis in the same and adjacent frequency bands in order to avoid harmful interference to other radiocommunication services and to existing applications of the sa service in which stations on board sub-orbital vehicles operate, having regard to the sub-orbital flight application scenarios;

3 to identify, as a result of the studies above, whether there is a need for access to additional sptrum that should be addressed after WRC-23 by a future competent conference,

Illustration of Sub-orbital Flights



ITU-R Issues Raised by the Agenda Item

- Blurring of the lines between terrestrial and satellite definitions
- At what altitude does space start?
  - What is meant by “major portion of the Earth’s atmosphere”
  - Is the Karman line (100km above mean sea level) an acceptable definition
  - What are the implication for and from the work being done by the UN Office for Outer Space Affairs
- When does a terrestrial station become a satellite station

Summary of Studies

- That sub-orbital vehicles will operate at altitudes where they would need to use allocations under both the appropriate terrestrial and satellite services
- That sub-orbital vehicles should operate under an appropriate allocation
- That the introduction of Sub-orbital Vehicles should be achievable without the need to:
  - changes to the current definitions in Article **1**
  - add a new definition(s) to Article **1**
  - affect the current in-band or adjacent frequency band interference environments
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Methods to Solve the Agenda Item

- **Method A:** No change (NOC) No new regulatory provisions are required. This method proposes to suppress Resolution **772 (WRC-19).** See also inconsistencies and difficulties mentioned in various parts of the draft document.
- **Method B:** A new WRC Resolution containing the provisions to operate radiocommunications for sub-orbital vehicles There are four alternative approaches to this method. All four approaches propose to suppress Resolution **772 (WRC-19).**
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Method B Approach A

The approach consists of a new Resolution:

- providing a perimeter for the stations on board sub-orbital vehicles;
- listing minimum required frequency bands to safely operate sub-orbital vehicles operated for aeronautical purposes defining the conditions under which the terrestrial and earth stations on board sub-orbital vehicles are allowed to operate in the same service under which these stations are classified;
- avoiding adversely affecting other systems and other services;
- inviting the Director of the BR to report to a future WRC in case of difficulties in the implementation of the Resolution.

- No changes to the Articles of the Radio Regulations are proposed.

Method B Approach B

- The approach consists of a new Resolution:
  - referring to Report ITU-R M.2477 for description of sub-orbital flight and of sub-orbital vehicle;
  - requiring frequencies to be used by sub-orbital vehicles in accordance with their regulatory status as either terrestrial or earth stations throughout all phases of flight. No changes to the Articles of the Radio Regulations, other than the new WRC Resolution.
- No changes to the Articles of the Radio Regulations are proposed.

Method B Approach C

- Approach C consists of a new Resolution, and no changes to the Articles of the Radio Regulations.
- The proposed new WRC-23 Resolution is based on the following elements:
  - A definition of stations on a sub-orbital vehicle which includes operation when in space and includes space launch vehicles.
  - The identification of the specific services in which sub-orbital vehicles may operate (AM(R)S, MSS, RNSS, and potentially others) and to clarify that stations on sub-orbital vehicles may operate as aircraft stations or earth stations in those services, for all parts of a flight.
  - The requirement that the operation of stations on sub-orbital vehicles in the above services is under the same conditions as those for conventional stations.
  - The exclusion of systems in the space operation service from the scope of the Resolution.

Method B Approach D

- Approach D consists of a new Resolution, which is based on the following elements:
  - Definition or description of sub-orbital flight and sub-orbital vehicle.
  - The identification of the specific services in which sub-orbital vehicles may operate (AM(R)S, MSS, RNSS and potentially others) and to clarify that stations on board suborbital vehicles may operate as terrestrial/aircraft stations or earth stations in those services. RR No. 4.4 shall be applied when the above services are used by stations on board sub-orbital vehicles beyond the major portion of the atmosphere.
  - The requirement that the operation of stations on sub-orbital vehicles in the above services is under the same conditions as those for conventional stations.
  - The sub-orbital vehicles shall ensure that it does not affect the existing civil aviation and space launch systems, and not impose any additional constraint on other services or applications operated in the same service.
- Note: If the application of RR No. 4.4 is not sufficient for earth stations or terrestrial stations when operation beyond the major portion of the atmosphere, the additional studies should be undertaken under a possible new agenda item for WRC-27..

ICAO Position

To support the regulatory provision for terrestrial stations and earth stations required onboard a suborbital vehicle to safely integrate it into air traffic service airspace, as decided by the responsible Member State(s), to maintain the services under which these stations are classified.
Any such changes to the Radio Regulations shall not create constraints on aeronautical operations.


Question