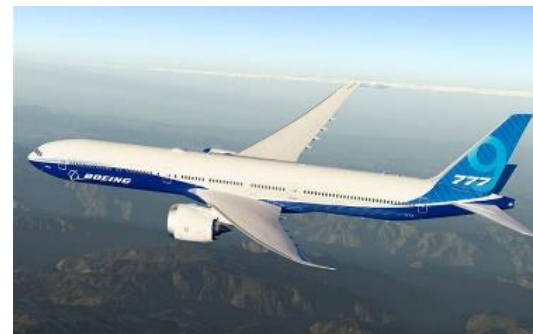


Agenda Item 1.6 “Space Planes”



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February 2023

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

RESOLUTION 772 (WRC-19): Consideration of regulatory provisions to facilitate the introduction of sub-orbital vehicles.

The Resolution *notes*:

- that Report ITU-R M.2477 provides information on the current understanding of radiocommunications for sub-orbital vehicles, including a description of the flight trajectory, categories of sub-orbital vehicles, technical studies related to possible avionics systems used by suborbital vehicles, and service allocations of those systems;

The Resolves Section provides, in relevant part:

1. to study spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations ...;

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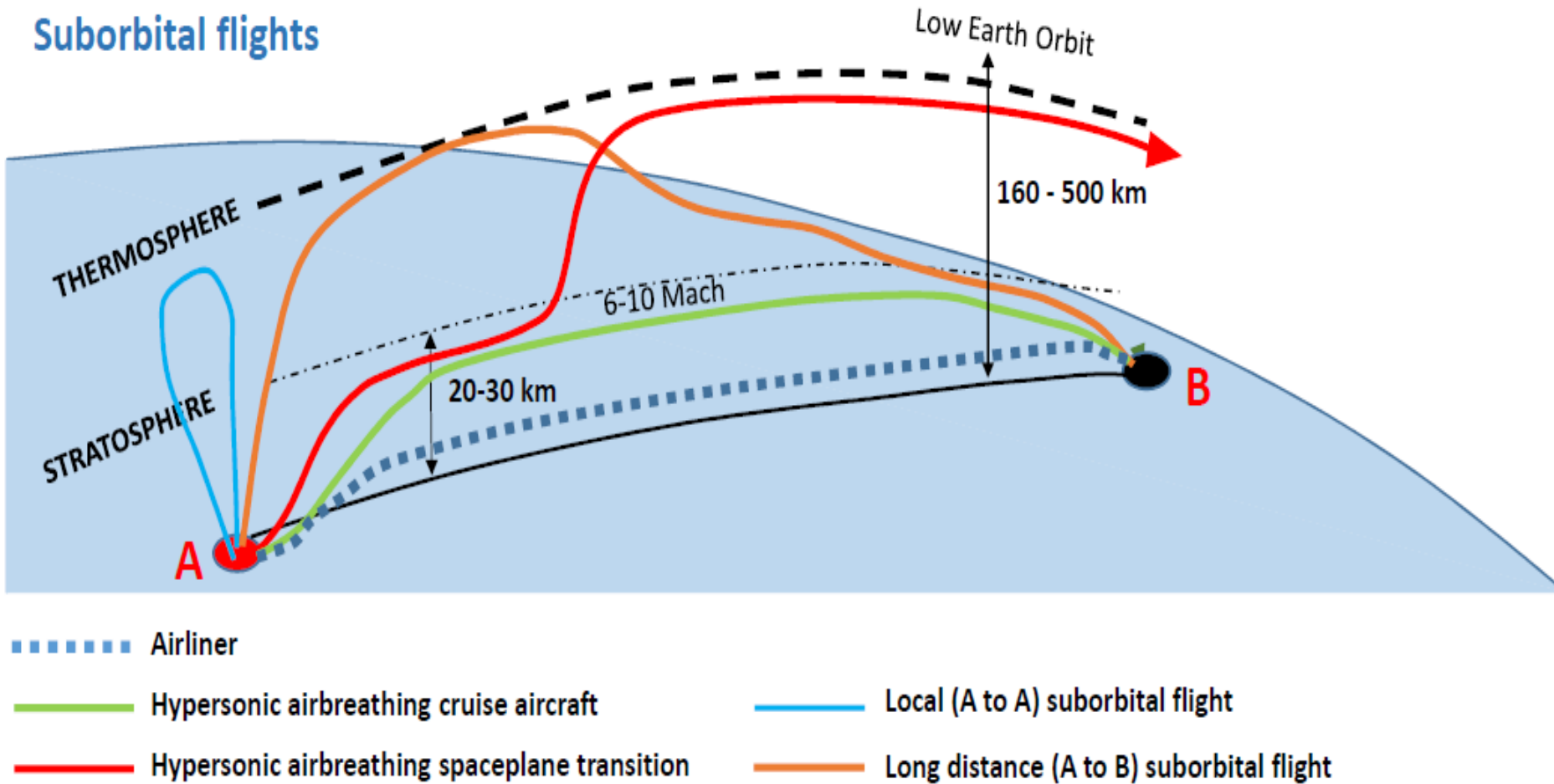
2. to study appropriate modification, if any, to the Radio Regulations, excluding any new allocations or changes to the existing allocations in Article 5, ... whilst avoiding any impact on conventional space launch systems, with the following objectives:
 - to determine the status of stations on sub-orbital vehicles, and study corresponding regulatory provisions to determine which existing radiocommunication services can be used 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;
 - 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 a 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 same 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 spectrum that should be addressed after WRC-23 by a future competent conference.

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The Agenda Item poses very interesting questions for the ITU, Regulators, and Industry:

- The ITU station definitions are not clear, and are related to what is a “major portion of the Earth’s atmosphere.” Where is this?
- Is there a correlation between the Earth’s atmosphere and when “Space” begins?
 - Is it above the troposphere, stratosphere, Armstrong Limit/Near Space, mesosphere, Karman Line, thermosphere, exosphere, etc.? -- no consensus.
- If the ITU agrees that “Space” begins at the Karman Line (100 km above sea level), is this also the maximum altitude of the Earth’s atmosphere?
- If not, where does the Earth’s atmosphere end, and where does a station change from one station definition to another?
 - When does a “major portion” begin?
 - Is it geographic?
 - Is it based on atmospheric density?
 - The Earth’s atmosphere is not uniform.

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After three years, the ITU has developed a Draft CPM document – finalized at CPM-2.

Summary of the Studies:

- The Agenda Item is trying to decide whether, and if so how, to address the potential inconsistencies in the application of the regulations for the stations on sub-orbital vehicles which could operate for a brief period of time in “space” or “above a major portion of the Earth’s atmosphere.”
- Radio stations operating onboard sub-orbital vehicles are expected to utilize frequency bands currently allocated to terrestrial and space radiocommunications services, while not changing the interference environment with existing applications of the same service and other radiocommunication services in-band and in adjacent frequency bands.
- There is no intention to define a new category of station in the RR. A station onboard a sub-orbital vehicle must conform to the definitions of *terrestrial stations* (RR No. **1.62**), *earth stations*, (RR No. **1.63**), and *space stations*, (RR No. **1.64**).
- One view is that when a platform reaches “space,” the classification of stations must change from a terrestrial station to another station which would likely change the service and spectrum allowed.
 - Space stations are defined as stations operating beyond, intended to go beyond, or has been beyond, the major portion of the Earth’s atmosphere.

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Summary of the Studies:

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- There is no intention to define a new category of station in the RR. A station onboard a sub-orbital vehicle must conform to the definitions of *terrestrial stations* (RR No. **1.62**), *earth stations*, (RR No. **1.63**), and *space stations*, (RR No. **1.64**).
- There are two Methods:
 - No Change to the Radio Regulations
 - Add a Resolution

There are 3 different ways to potentially address the Agenda Item within the Resolution Method

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Method B, Approach A:

- Provide definitions of sub-orbital flight and of sub-orbital vehicles;
- Lists a limited number of frequencies and frequency bands allowed to provide safe aeronautical operations (117.975-136 MHz, 1090 MHz, 1164-1300 MHz, 1559-1610 MHz, 1545-1555 MHz (space-to-Earth), 1646.5-1656.5 MHz (Earth-to-space), and 5030-5091 MHz) but subject to change;
- providing provisions to avoid adversely affecting other systems and other services;
- When operating in airspace used by commercial aircraft, the sub-orbital vehicle must use the same frequency bands and services as those used by commercial aircraft.
- When operating in 'space,' stations are not protected from interference from other services and cannot cause interference to other services.

Method B, Approach B:

- Stations onboard sub-orbital vehicles may be terrestrial stations and earth stations, and can be used in all phases of flight within their respective service allocations.
- Such stations shall not impose any new constraints on applications in the same service and other radiocommunication services allocated on a primary basis in the same and adjacent frequency bands.

Method B, Approach C:

- Provides a definition of sub-orbital vehicle and its required flight;
- Identifies the specific services in which sub-orbital vehicles may operate (AM(R)S, MSS, RNSS, and potentially others);
- Clarifies that stations on sub-orbital vehicles may operate as aircraft stations or earth stations in those services, for all parts of a flight;
- Operation of stations on sub-orbital vehicles in the above services is under the same conditions as those for conventional stations.

