
PLENARY MEETING

**Addendum 4 to
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Member States of the Inter-American Telecommunication Commission (CITEL)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 9.1(9.1.4)

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

9.1 on the activities of the Radiocommunication Sector since WRC-15;

9.1 (9.1.4) Resolution **763 (WRC-15)** - Stations on board sub-orbital vehicles

INTRODUCTION

At present there are vehicles which may reach altitudes greater than 100 km, also known as sub-orbital flight, and then return to earth without reaching orbit or deep space. These vehicles are called sub-orbital vehicles or space planes.

Accordingly, in order to ensure the development and transition to operational use of such vehicles, all of the regulatory issues including the Radio Regulations (RR) provisions, need to be addressed, and it must be determined if the telecommunication services used by sub-orbital vehicles can be viewed as part of existing radiocommunication services or if it is necessary that a future World Radiocommunication Conference define new radiocommunication services and even if it can assign frequency bands to these services to accommodate these vehicles.

BACKGROUND:

Advances in propulsion technology and rocket power has facilitated the design of vehicles which may reach altitudes greater than 100 km, also known as sub-orbital flight, and then return to earth without reaching orbit or deep space. A sub-orbital vehicle may be used for the purposes of commercial space flight, scientific research, point to point travel, cargo transportation, or Earth observation.

Commercial space flight has become a reality with a number of companies promising the chance to experience space flight. The 2015 World Radiocommunication Conference (WRC-15) adopted

Resolution **763 (WRC-15)** to deal with stations on board suborbital vehicles¹. It was resolved to conduct studies during the WRC-19 study cycle:

- to identify any required technical and operational measures, in relation to stations on-board suborbital vehicles, that could assist in avoiding harmful interference between radiocommunication services.
- to determine spectrum requirements and, based on the outcome of those studies, to consider a possible future agenda item for WRC-23.

It is also noted that ITU-R in 2015 formulated Question ITU-R No. [259/5](#), "Operational and radio regulatory aspects for planes operating in the upper level of the atmosphere", and that studies in the framework of that Question are related to Resolution **763 (WRC-15)**. In particular, *decides* 3 of that Question asks, "what radio links will be required to support space planes operations and under what radiocommunication service definition will they fall?"

Suborbital vehicles, including space planes, have been developed to go beyond the major portion of the Earth's atmosphere for brief periods, however they also must share airspace with conventional aircraft during certain phases of flight. These vehicles can reach space and may perform a mission, such as deploying a space vehicle, conducting scientific research, or allowing tourists to participate in space flight, and then they return to the Earth's surface.

Communications with those sub-orbital vehicles currently consists of telemetry, telecommand, and control (TT&C), sometimes operating under the Space Operations Service (SOS), to allow for control of the vehicle, and mission-related communications. There are currently no radiocommunications between the air traffic management (ATM) or air traffic control (ATC) functions and sub-orbital vehicles.

Sub-orbital vehicles, however, must integrate safely into the same airspace as conventional aircraft during their transition to and from space. To address this, most air navigation service providers currently ensure safe integration by completely segregating sub-orbital vehicles from other aircraft during launch and recovery operations; clearing the airspace of non-participating aircraft in three spatial dimensions and in time to maintain the required level of safety. The dimensions of the cleared airspace are driven by existing launch range facility TT&C data capability.

The current airspace segregation approach comes at the expense of space launch and recovery opportunities, air traffic efficiency, and additional fuel and time required for aircraft to avoid hazardous areas. This method of separating space launch and recovery operations from air traffic will not be sustainable with the increase in demand for space access by additional sub-orbital vehicles operating on and off traditional ranges.

As called for by Resolution **763 (WRC-15)**, ITU-R has developed a working document towards a preliminary draft new report ITU-R M.[SUBORBITAL VEHICLES] titled, "Radiocommunications for suborbital vehicles". The work has been informed by the international civil aviation organization (ICAO) and Administrations and has identified planned future approaches to airspace integration that would avoid or reduce airspace segregation by enabling radio stations on-board sub-orbital vehicles to use frequencies allocated to terrestrial radiocommunications for the purpose of ATM/ATC voice/data communications, surveillance, and navigation services. Such approaches, if standardized by ICAO, would ensure interoperability of sub-orbital vehicles with the ATM/ATC and aircraft avionics, while maintaining flight safety of the sub-orbital vehicle and of other aircraft that occupy the airspace through which the sub-orbital vehicle traverses. This would enable ATC to

¹ Suborbital vehicle: A vehicle intended for sub-orbital flight, all or some stages or components of which may be reusable or expendable.

regain lost air traffic efficiency, enhance airborne collision avoidance, and reduce fuel / emissions demand. The study suggests that it's technically feasible for suborbital vehicles to operate under existing space and terrestrial radiocommunication service allocations, if permitted by the Radio Regulations, for the ATM/ATC applications identified in the report. Using existing allocations would provide international harmonization and interoperability with those systems and applications related to aviation safety, as standardized by ICAO, such as ATM/ATC and aircraft avionics.

There have been questions raised regarding whether the regulatory provisions within the ITU-R Radio Regulations (RR) for terrestrial and space services are adequate to support these types of approaches to the integration of suborbital vehicles into the ATM, and whether additional spectrum provisions may be needed.

ITU-R Working Party 5B has developed a draft new report containing several studies related to link budget analyses, Doppler shift during various phases of flight, and the possible use of existing aeronautical systems for sub-orbital vehicles. However, further study is needed:

- to assess how applications commonly operated under terrestrial services, in particular aeronautical mobile services, or under space services could be used for sub-orbital vehicles;
- to assess the potential for interference between services in the case of a sub-orbital vehicle operated with terrestrial and space stations;
- to consider under which radiocommunication services sub-orbital vehicles operate.

At CPM 19-2, the text for agenda item 9, issue 9.1.4 was finalized with a single conclusion that further operational, technical and regulatory issues may need to be addressed, which requires continuing studies.

CONCLUSIONS

Studies have shown that further consideration is needed with regards to the definition of a sub-orbital vehicle in the Radio Regulations and under which radiocommunications service(s) they should operate. Studies also indicate that at certain altitudes, additional technical and operational measures may be needed to ensure safety-of-flight operations of suborbital vehicles and aircraft, which is the responsibility of ICAO. For example, ATM applications require radio equipment that's interoperable with ICAO standardized systems, in all phases of flight, to prevent collisions with conventional aircraft. Additional technical studies and regulatory provisions are therefore necessary to improve the integration of sub-orbital vehicles into the ATM systems.

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RESOLUTION 763 (WRC-15)

Stations on board sub-orbital vehicles

Reasons: The studies conducted in the ITU-R study groups on this issue have been concluded; therefore, Resolution 763 is no longer necessary.