



PLENARY MEETING

**Addendum 6 to
Document 6053-E
4 October 2023
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African Common Proposals

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.6

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

Introduction

The ITU-R was invited to study the spectrum needs for stations on board sub-orbital vehicles (SOVs), appropriate modification, if any, to the Radio Regulations (RR), excluding any new allocations or changes to the existing allocations in RR Article **5** to accommodate stations on board sub-orbital vehicles, with achieving 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;
- to facilitate radiocommunications that support aviation to safely integrate sub-orbital vehicles into airspace and ensure interoperability with international civil aviation;
- define the relevant technical characteristics and protection criteria for the sharing and compatibility studies with incumbent and adjacent services;
- 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.

Proposal

In light of the results of studies, the African Common Proposal support the revision of Resolution **772 (WRC-19)** in order to:

- Clarify the list of necessary sharing and compatibility studies with the incumbent services that are allocated on a primary basis in the same and adjacent frequency bands and to extend their duration in order to complete these studies during the next WRC study cycle.
- Define the list of possible interference scenarios, including scenarios for the use of stations on board a sub-orbital vehicle in the part of the flight path in outer space.
- Identify the radiocommunication services that are supposed to be used by SOVs stations with their respective frequency allocations specially the frequency ranges supposed to be used for safety purposes.

Procedural and regulatory considerations as follows:

MOD AFCP/6053A6/1

RESOLUTION 772 (~~WRC-19~~[REV.WRC-23](#))

**Consideration of regulatory provisions to facilitate
the introduction of sub-orbital vehicles**

The World Radiocommunication Conference (~~Sharm el-Sheikh, 2019~~[Dubai, 2023](#)),

considering

- a) that sub-orbital vehicles are being developed which are intended to operate at higher altitudes than conventional aircraft, with a sub-orbital trajectory;
- b) that sub-orbital vehicles are also being developed to fly through the lower levels of the atmosphere, where they are expected to operate in the same airspace as conventional aircraft;
- c) that sub-orbital vehicles may perform various missions (e.g. conducting scientific research or providing transportation) and then return to the Earth's surface without completing a full orbital flight around the Earth;
- d) that stations on board sub-orbital vehicles have a need for voice/data communications, navigation, surveillance and telemetry, tracking and command (TT&C);
- e) that sub-orbital vehicles must be safely accommodated into airspace used by conventional aircraft during certain phases of flight;
- f) that there is a need to ensure that equipment installed on such vehicles can communicate with air traffic management systems and relevant ground control facilities;
- g) that vehicles operating at the boundary of space and the atmosphere or re-entering the atmosphere may generate a plasma sheath that may envelop all or most of the vehicle;
- h) that the plasma-sheath attenuation does not allow for radiocommunications directly to either ground or space stations,

recognizing

- a) that there is no internationally agreed legal demarcation between the Earth's atmosphere and the space domain;
- b) that there is no formal definition of sub-orbital flight, although it has been assumed in Report ITU-R M.2477 to be an intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space without completing a full orbit around the Earth before returning back to the surface of the Earth;
- c) that stations on board sub-orbital vehicles may use systems operating under space and/or terrestrial services;
- d) that the current regulatory provisions and procedures for terrestrial and space services may not be adequate for international use of relevant frequency assignments by stations on board sub-orbital vehicles;
- e) that Annex 10 to the Convention on International Civil Aviation contains Standards and Recommended Practices for aeronautical radionavigation and radiocommunication systems used by international civil aviation;

- f) that the studies on spectrum requirements for voice/data communications, navigation, surveillance and TT&C on stations on board sub-orbital vehicles have not been completed;
- g) that some space launch systems may include components or items not reaching orbital trajectories, and that some of these components or items may be developed as reusable items operating on sub-orbital trajectories;
- h) that conventional space launch systems currently have a radiocommunication regulatory framework that may differ from the future radiocommunication framework of sub-orbital vehicles,

noting

- a) Question ITU-R 259/5, on operational and radio regulatory aspects for planes operating in the upper level of the atmosphere;
- b) 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 sub-orbital vehicles, and service allocations of those systems;
- c) that the provisions of No. **4.10** may apply to certain aspects of these operations;
- d) that the development of compatibility criteria between International Civil Aviation Organization (ICAO) standardized aeronautical systems is the responsibility of ICAO;
- e) that the definitions and future applicable radiocommunication services for sub-orbital vehicles should be clarified by the ITU Radiocommunication Sector (ITU-R), with necessary coordination with ICAO,

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, *inter alia*, 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 sub-orbital 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 used by stations on sub-orbital vehicles, if necessary;
- to determine the technical and regulatory conditions to allow some stations on board sub-orbital 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 provide that the level of permissible interference for security services is not exceeded and 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, including scenarios that consider

the use of ground/earth stations on board a sub-orbital vehicle in a part of its flight path passing through outer space;

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,

invites the International Civil Aviation Organization

to participate in the studies and provide to ITU the relevant technical characteristics required for the studies called for in *resolves to invite the ITU Radiocommunication Sector*,

invites the [2023/2027](#) World Radiocommunication Conference

to consider the results of the studies above and take the appropriate action,

instructs the Director of the Radiocommunication Bureau

to bring this Resolution to the attention of the relevant ITU-R study groups,

invites administrations

to participate actively in the studies by submitting contributions to ITU-R,

instructs the Secretary-General

to bring this Resolution to the attention of the United Nations Committee on the Peaceful Uses of Outer Space and ICAO and other international and regional organizations concerned.

Reasons:

The required studies provided under *resolves to invite the ITU Radiocommunication Sector 2* of Resolution **772 (WRC-19)** were not completed with the list of possible interference scenarios, including scenarios for the use of ground/earth stations on board a sub-orbital vehicle in a section of its flight path passing in outer space.

As per the *recognizing c) and d)* of the draft new Resolution (WRC-23) proposed under Method B in the Report of the CPM to WRC-23, SOVs may have a radiocommunication impact on larger areas involving additional territories and/or on space stations (due to operation in higher altitudes) and may impact services operating in the same and adjacent or nearby frequency bands (due to increase of Doppler shift).