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| U.S. Radiocommunications SectorFact Sheet |
| **Working Party:** ITU-R WP 5B | **Document No:** USWP5B28-02 |
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| **Purpose/Objective:** This contribution provides updates to the Working Document towards Draft CPM Text for WRC-23 Agenda Item 1.6 to facilitate the introduction of sub-orbital vehicles (SoV). |
| **Abstract:** Resolution **772** (**WRC-19**), in preparation for Agenda Item 1.6 (WRC-23), invites the ITU-R to study the spectrum needs for stations on board sub-orbital vehicles, any appropriate modification to the Radio Regulations, excluding any new allocations or changes to the existing allocations in Article **5**, and to identify whether there is a need for access to additional spectrum that should be addressed after WRC-23 by a future competent conference. This contribution provides some regulatory provisions to the WD-Draft CPM Text for WRC-23 AI 1.6 to facilitate the introduction of sub-orbital vehicles. |

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| **Radiocommunication Study Groups** |  |
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**Introduction**

Resolution **772 (WRC-19)**, in preparation for Agenda Item 1.6 (WRC-23), invites the ITU-R to study the spectrum needs for stations on board sub-orbital vehicles, any appropriate modification to the Radio Regulations, excluding any new allocations or changes to the existing allocations in **Article 5**, and to identify whether there is a need for access to additional spectrum that should be addressed after WRC-23 by a future competent conference. This contribution provides some regulatory provisions to the WD-Draft CPM Text for WRC-23 AI 1.6 to facilitate the introduction of sub-orbital vehicles.

Attachment: 1

ATTACHMENT

working document towards draft cpm text for wrc-23 agenda item 1.6

CHAPTER 2

Aeronautical and maritime issues

(Agenda items 1.6, 1.7, 1.8, 1.9, 1.10, 1.11)

Agenda item 1.6

**(WP 5B[[1]](#footnote-1)\* /** **WP 3M, WP 4A, WP 4C, WP 7B, WP 7D)**

*1.6 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.*

# 2/1.6/1 Executive summary

*[Text of the executive summary, not more than half a page of text to describe briefly the purpose of the agenda item, summarize the results of the studies carried out and, most importantly, provide a brief description of the method(s) identified that may satisfy the agenda item. See also § A2.1 of Annex 2 to* [*Resolution ITU-R 2-8*](http://www.itu.int/pub/R-RES-R.2-8-2019)*]*

To address this agenda item, ITU-R has undertaken studies, pursuant to Resolution **772 (WRC-19)**, on regulatory provisions to facilitate the introduction of sub-orbital vehicles.

Four Methods are proposed to address this agenda item:

Method A

No change to the Radio Regulations (RR).

Method B

A WRC Resolution, not incorporated by reference in the RR.

Method C

Modification of RR Article **4**.

Method D

No Change to RR Article **4**.

# 2/1.6/2 Background

[Text of the background, not more than half a page of text to provide general information in a concise manner, in order to describe the rationale of the agenda items (or issue(s)). See also § A2.2 of Annex 2 to [Resolution ITU-R 2-8](http://www.itu.int/pub/R-RES-R.2-8-2019)]

Suborbital flight is defined as “The 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.” Suborbital vehicle is defined as “a vehicle executing suborbital flight.”

WRC-23 agenda item 1.6 is intended, among other aspects, to safely integrate suborbital vehicles into the same airspace as conventional aircraft during their transition to and from space in order to minimize the airspace disruption.

# 2/1.6/3 Summary and Analysis of the results of ITU-R studies

[This section should contain a summary of the technical and operational studies performed within ITU-R, including a list of relevant ITU-R Recommendations. Depending on the agenda item, this section could be divided in two parts, one part dealing with the summary and the other part dealing with the analysis. The results of the ITU-R studies should also be analysed with respect to the possible methods of satisfying the agenda item and presented in a concise manner.]

Radio stations operating onboard suborbital vehicles are expected to operate in frequency bands currently allocated for both terrestrial and space services. During the preparations for WRC-23 agenda item 1.6, some inconsistencies were raised between the operational use of stations on-board suborbital vehicles, and the definitions of *terrestrial stations* in RR No **1.62**, *earth stations* in RR No **1.63**, and *space stations* in RR No **1.64**. While in the RRs the use of those specific radiocommunication services is dependent on whether the station is in, or not in, “space”, the definition of such a boundary does not exist in the RRs. In addition, the suborbital vehicle may be physically located within the major portion of Earth’s atmosphere or beyond for a brief period of time, but the physical location of the suborbital vehicle on which the stations are located does not necessarily change the need for, or purpose of, the use of specific radiocommunication services. The condition of such operation needs to be decided by WRC-23.

Studies found in Report ITU-R M.2477 show that suborbital vehicle operations require making unavailable large areas of international and national airspace during their transition to and from space. This results in airspace disruptions, extra travel time, re-routing flight paths, additional aircraft fuel consumption, etc. The studies also shows the feasibility of using the current aircraft avionics systems onboard suborbital vehicles, to facilitate the safe integration of suborbital vehicles into the same airspace as conventional aircraft during their transition to and from space in order to minimize the airspace disruption. The report also identified several existing radiocommunications services that can be used by stations onboard suborbital vehicles, but may not necessarily be limited to: a) AM(R)S for VHF voice and data communications and ADS-B; b) RNSS for navigation with GNSS systems in 1 164-1 215 MHz and 1 559-1 610 MHz; MSS for voice and data communications; and MS and MSS for TT&C applications.

# 2/1.6/4 Methods to satisfy the agenda item

*[This section should contain the brief description of the Method or Methods to satisfy the agenda item as per section A2.4 of Annex 2 to* [*Resolution ITU-R 2-8*](http://www.itu.int/pub/R-RES-R.2-8-2019)*]*

## 2/1.6/4.1 Method A: No change (NOC).

[This method NOC covers the case in which the assessment of suborbital vehicles operating relative to the current regulatory conditions under the Radio Regulations are sufficient to address their requirements.]

## 2/1.6/4.2 Method B: Example text for a new WRC-23 Resolution on the assignment and use of frequencies

This method is for a WRC-23 Resolution (a modification of Resolution 772 (WRC-19) to specify that stations onboard sub-orbital vehicles may use frequencies allocated to aeronautical mobile, mobile-satellite, space operation, radionavigation, and radionavigation-satellite services during all phases of flight.

## 2/1.6/4.3 Method C: Modification to Article 4 of the Radio Regulations: Assignment and use of frequencies

This method is an alternative of Method A that covers the case which assessment done under agenda item 1.6 supports a new provision to be added to RR Article **4**. This new provision would clarify the use of *mobile, mobile-satellite, radionavigation, and radionavigation-satellite* service allocations for radiocommunications with and used by suborbital vehicles.

## 2/1.6/4.4 Method D: No change to Article 4 of the Radio Regulations

# 2/1.6/5 Regulatory and procedural considerations

*[Example(s) of regulatory text relating to the Method(s) to satisfy the agenda item]*

## 2/1.6/5.1 For Method A: No Change

*[Example(s) of regulatory text for the first method to satisfy the agenda item]*

NOC

2/1.6/5.2 For Method B: New WRC-23 Resolution

*[Example(s) of regulatory text for the method to satisfy the agenda item]*

MOD

RESOLUTION 772 (rev. WRC-23)

**Use of Stations Onboard Suborbital Vehicles**

The World Radiocommunication Conference ( 2023),

*Considering*

*a)* that sub-orbital vehicles operate at higher altitudes than conventional aircraft, with a sub-orbital trajectory;

*b)* that sub-orbital vehicles fly through the lower levels of the atmosphere, where they 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 sub-orbital 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;

*recognizing*

*a)* that there is no internationally agreed legal demarcation between the Earth’s atmosphere and the space domain;

*b)* that Report ITU-R M.2477 sub-orbital flight is defined as 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 Report ITU-R M.2477 defines a sub-orbital vehicle as a vehicle executing sub-orbital flight;

*d)* that stations on board sub-orbital vehicles may use systems operating under space and/or terrestrial services;

*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 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;

*noting*

*a)* that Report ITU-RM.2477 provides information on 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;

*b)* that the provisions of No. **4.10** may apply to certain aspects of these operations;

*c)* that the development of compatibility criteria between International Civil Aviation Organization (ICAO) standardized aeronautical systems is the responsibility of ICAO;

*resolves*

1 that sub-orbital flight is defined as 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;

2 that a sub-orbital vehicle is defined as a vehicle executing sub-orbital flight; :

3 that stations onboard suborbital vehicles may communicate using the mobile, mobile-satellite, space operation, radionavigation, and radionavigation-satellite services during all phases of flight.

*instructs the Secretary-General*

to bring this Resolution to the attention of ICAO.

*invites the International Civil Aviation Organization*

to take into account this Resolution and Report ITU-R M.2477 in the course of developing SARPs for sub-orbital vehicles.

**Reasons:** This action will clarify that sub-orbital vehicles may communicate with the mobile, mobile-satellite, space operation, radionavigation, and radionavigation-satellite services during all phases of flight.

2/1.6/5.3 For Method C: Modification to Article 4

ARTICLE 4

Assignment and use of frequencies

**ADD**

**4.XX** Stations onboard suborbital vehicles are authorized to use frequencies allocated to mobile, mobile-satellite, radionavigation, and radionavigation-satellite services independent of whether those suborbital vehicles are in space.
 (see Nos. **1.62**, **1.63**, and **1.64**).

**SUP**

RESOLUTION 772 (WRC‑19)

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

2/1.6/5.4 For Method D: No Method C

No Change to Article 4 of the Radio Regulations

[Example(s) of regulatory text for the method to satisfy the agenda item]

Annex

Figure 1

Examples of the operational concepts of a suborbital flight.



1. \* Note: See relevant text in CPM23-1 meeting report (Annex 4 to BR Administrative Circular [CA/251](https://www.itu.int/md/R00-CA-CIR-0251/en)) on how to facilitate the work related to satellite. [↑](#footnote-ref-1)