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| U.S. Radiocommunications SectorFact Sheet |
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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 of Chapter 2

**(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)*]*

Resolution 772 (WRC-19) 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.

Studies have been carried out in Report ITU-R M.2477 showing current space launches require large areas of international and national airspace that are made unavailable during the launch and re-entry window. This results in airspace disruptions, extra travel time, re-routing flight paths, additional aircraft fuel consumption, etc. Studies in Report ITU-R M.2477 also show the feasibility of using the current 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. Report ITU-R M.2477 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 for TT&C applications.

For the purpose of utilizing frequency allocations, suborbital vehicles must be considered as operating in the terrestrial domain when using terrestrial radiocommunications and in the space domain when using space radiocommunications. Hence, there is a need for a proposal for this clarification to be made in Article 4 of the Radio Regulations.

Furthermore, there is a need to clarify that suborbital vehicles should not be interpreted as a spacecraft from RR definition since suborbital vehicles do not stay in the orbit and must return to the Earth without completing a full orbit around the Earth. Suborbital vehicles also do not fit in the existing Article 1 definition of aircraft since a portion of the flight occurs in space. Since a suborbital vehicle is currently not defined in the Radio Regulations and doesn’t fit the existing Article 1 definitions of spacecraft or aircraft. Hence, there is a need for a proposal for the definitions to be made in Article 1 of the Radio Regulations.

Therefore, method A proposes to add two definitions to Article 1 and a clarification to Article 4 of the Radio Regulations to resolve these issues.

For this agenda item, one method has been identified:

Method A

This method proposes to add two definitions to Article 1 and a clarification to be made to Article 4 of the Radio Regulations.

Proposal for **Article 1** definitions:

*Suborbital vehicle - a vehicle executing suborbital flight.*

*Suborbital flight - 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 to the surface of the Earth.*

Proposal for this clarification to be made in **Article 4**:

*Stations onboard suborbital vehicles (SoV; RR 1.xxx) may use allocations to terrestrial and/or space radiocommunications services during all phases of flight independent of the vehicle’s altitude. Such use shall have the same status as those allocations, and be operated in accordance with any limitations of those allocations as specified in Article 5.*

# 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)*]*

With the rapid development of the various suborbital flight concepts and technologies in recent years, such as hypersonic flight and reusable carrier rocket technology, suborbital flight has become an operational reality, which supports a wide range of fields including education, transportation, tourism, and scientific research. Current research and development aim to enable suborbital vehicles to be capable of carrying several thousand kilograms of cargo and passengers by 2035 and up to 6 000 flights per year by 2045.

According to Report ITU-R M.2477, a suborbital vehicle (SoV) is a vehicle executing suborbital flight and 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. Currently, there are a variety of technical solutions to achieve suborbital flight. Launch modes include horizontal and vertical, landing modes include horizontal landing and vertical landing, recovery modes include self-controlled return and parachute recovery, and thrust modes include rocket power and combined power. Suborbital flights can be implemented by different combinations of the above modes. Figure 1 show examples of the operational concepts of a suborbital flight.

Figure 1

Examples of the operational concepts of suborbital flight





Studies have been carried out in Report ITU-R M.2477 showing current space launches require large areas of international and national airspace that are made unavailable during the launch and re-entry window. This results in airspace disruptions, extra travel time, re-routing flight paths, additional aircraft fuel consumption, etc. Studies in Report ITU-R M.2477 also show the feasibility of using the current 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. Report ITU-R M.2477 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 for TT&C applications.

This agenda item will address some key issues, including regulatory issues, in order 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.]*

# 2/1.6/4 Methods to satisfy the agenda item[[2]](#footnote-2)1

*[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: [title of Method A, if any][[3]](#footnote-3)2

*[Text describing the first method to satisfy the agenda item]*

This method proposes to add two definitions to Article 1 and a clarification to be made to Article 4 of the Radio Regulations.

Proposal for **Article 1** definitions:

*Suborbital vehicle - a vehicle executing suborbital flight.*

*Suborbital flight - 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 to the surface of the Earth.*

Proposal for this clarification to be made in **Article 4**:

*Stations onboard suborbital vehicles (SoV; RR1.xxx) may use allocations to terrestrial and/or space radiocommunications services during all phases of flight independent of the vehicle’s altitude. Such use shall have the same status as those allocations, and be operated in accordance with any limitations of those allocations as specified in Article 5.*

## 2/1.6/4.2 Method B: [title of Method B, if any]

*[Text describing the second method to satisfy the agenda item]*

*[Additional sections with text describing other methods to satisfy the agenda item, if any]*

# 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: [title of Method A, if any]

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

ARTICLE 1

**Terms and definitions**

**Section IV – Radio stations and systems**

**MOD**

**1.xxx** *Suborbital vehicle:* a vehicle executing suborbital flight.

**Section V – Operational terms**

**MOD**

**1.yyy** *Suborbital flight:* 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 to the surface of the Earth.

ARTICLE 4

**Assignment and use of frequencies**

**MOD**

**4.xx** Stations onboard suborbital vehicles (RR 1.xxx) may use allocations to terrestrial and/or space radiocommunications services during all phases of flight independent of the vehicle’s altitude. Such use shall have the same status as those allocations, and be operated in accordance with any limitations of those allocations as specified in Article 5.

**SUP**

RESOLUTION 772 (WRC-19)

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

## 2/1.6/5.2 For Method B: [title of Method B, if any]

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

*[Additional sections with example(s) of regulatory text for the other methods to satisfy the agenda item, if any]*

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)
2. 1 If a single Method is proposed to satisfy a given agenda item, it does not need to bear a number as it would be the only **Method to satisfy the agenda item**, in both Sections **2/1.6/4** and **2/1.6/5**. [↑](#footnote-ref-2)
3. 2 If alternatives are proposed to a given Method, they could be described as Sub-Methods in new sub-sections, e.g. Sub-Method A1 (to Method A) in sub-section **2/1.6/4.1.1** and Sub-Method A2 (to Method A) in sub-section **2/1.6/4.1.2**. [↑](#footnote-ref-3)