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| A close up of a sign  Description automatically generated | **World Radiocommunication Conference (WRC-23) Dubai, 20 November - 15 December 2023** | |  |
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| PLENARY MEETING | | **Addendum 6 to Document 111-E** | |
|  | | **30 October 2023** | |
|  | | **Original: Chinese** | |
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| China (People's Republic of) | | | |
| 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

Resolution **772 (WRC-19)**, in preparation for WRC-23 agenda item 1.6, invites 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 RR 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.

The CPM Report on technical, operational and regulatory/procedural matters to be considered by WRC-23 proposes three methods to address agenda item 1.6, of which Method B has four approaches.

Proposals

China supports Approach D of Method B in the CPM Report.

This contribution proposes modifications to the new WRC Resolutionassociated with Approach D of Method B in the CPM Report. The new Resolution states that sub-orbital vehicles may use aircraft stations and earth stations and corresponding radio services for the entire duration of flight, and provides corresponding use conditions within and beyond the major portion of the Earth’s atmosphere separately.

ADD CHN/111A6/1#1588

DRAFT NEW RESOLUTION [A16] (WRC‑23)

Regulatory provisions for the operation of radiocommunications   
on sub-orbital vehicles

The World Radiocommunication Conference (Dubai, 2023),

considering

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

*b)* that sub-orbital vehicles operate through the lower levels of the atmosphere, where some may operate in the same airspace as conventional aircraft;

*c)* that sub-orbital vehicles may perform various missions such as conducting scientific research or providing transportation;

*d)* that stations on board sub-orbital vehicles are expected to provide all or some of the following applications; voice/data communications, navigation, surveillance, and telemetry, tracking and command (TT&C);

*e)* that sub-orbital vehicles must be safely integrated into airspace used by conventional aircraft;

*f)* that some stations on board sub-orbital vehicles may need to communicate with air traffic management systems and relevant ground control facilities;

Approach A supports the *considering* below:

*g)* that some orbital satellite launch rocket systems or components may be considered as sub-orbital vehicles;

*h)* that the stations on board orbital satellite launch rocket or deep space launch rocket systems may be operated under the space operation service without having to apply the provisions contained in the present Resolution;

*i)* that sub-orbital vehicles moving at very high velocity might generate a plasma sheath that may envelop all or most of the vehicle, which could impact communications,

Approach C supports the following *considering*:

*g)* that some satellite launch rocket systems or components may be considered as sub-orbital vehicles, operating at times above the atmosphere,

**Approach D supports the following *considering*:**

*g)* that sub-orbital vehicles moving at very high velocity might generate a plasma sheath that may envelop all or most of the vehicle, which could impact communications,

noting

*a)* that Report ITU‑R M.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 operations of sub-orbital vehicles;

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

*d)* that ICAO develops, in some cases, Standards and Recommended Practices (SARPs) to address the coexistence between ICAO aeronautical applications;

Approach B and Approach C and Approach D support the inclusion of the following *noting:*

*e)* that Report ITU‑R M.2477 describes sub-orbital flight 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;

*f)* that Report ITU‑R M.2477 describes a sub-orbital vehicle as a vehicle executing sub‑orbital flight,

recognizing

*a)* that there is no internationally agreed legal demarcation between the Earth’s atmosphere and the space domain, nor between the sovereign airspace and outer space;

*b)* that Annex 10 to the Convention on International Civil Aviation contains SARPs for aeronautical radionavigation and radiocommunication systems used by international civil aviation;

*c)* that, due to the increase of Doppler shift, emissions from stations on board sub-orbital vehicles may impact services operating in the same and adjacent or nearby frequency bands;

*d)* that, due to the higher altitude of sub-orbital vehicles compared to conventional aircraft, emissions from stations on board sub-orbital vehicles may have a radiocommunication impact on larger areas involving additional territories and/or on space stations;

Approach B, Approach C and Approach D support the following *recognizing:*

*e)* that some space launch systems may have space stations that already operate as part of existing space operation service allocations;

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

*g)* that some sub-orbital vehicles could reach altitudes for a brief period of time beyond the major portion of the Earth's atmosphere without sufficient energy to enter orbit,

resolves

Approach A:

1 that stations fitted on board a sub-orbital vehicle shall be restricted to operate around the Earth without having the ability or intention to become a station on board a satellite (see No. **1.179**);

2 that terrestrial stations and earth stations required on board a sub-orbital vehicle to safely accommodate or integrate it into airspace where air traffic services are provided, as decided by the competent aviation authority of the Member State(s)[[1]](#footnote-1)1:

2.1 are allowed to operate in the same service under which these stations are classified when they are used on conventional aircraft;

2.2 shall, for the frequency bands identified in the Convention on International Civil Aviation and its annexes that includes SARPs, be operated in accordance with the relevant recognized international aeronautical standards;

2.3 shall not affect the existing and future applications of the same service and/or other radiocommunication services in the same and adjacent frequency bands any more than they would if the same stations were fitted on board a conventional aircraft;

3 that administrations allowing the operation of each station on board sub-orbital vehicles identified in *resolves*2 shall consider coexistence between these terrestrial stations and/or earth stations, and other applications, taking into account *considering c)* and *d)*;

4 that terrestrial and earth stations on board a sub-orbital vehicle other that those identified in *resolves* 2 shall not claim protection from nor create harmful interference to any station operated in the same and adjacent frequency bands unless there is an agreement between the administrations concerned, taking into account *considering* *c)* and *d)*,

Approach B:

1 that sub-orbital vehicles may use terrestrial stations (No. **1.62**) and earth stations (No. **1.63**) during all phases of flight;

2 that terrestrial stations and earth stations on board sub-orbital vehicles referred to in *resolves*1 shall maintain their station class unchanged;

3 that the stations on board sub-orbital vehicles referred to in *resolves* 1 shall not cause additional interference to nor claim additional protection from the existing applications of the same service and on other radiocommunication services in the same and adjacent frequency bands,

**Reasons:** This action will clarify that stations on board sub-orbital vehicles may be terrestrial stations (RR No. **1.62**) and earth stations (RR No. **1.63**) and can be used in all phases of flight, within their respective service allocations. The stations shall not impose any new constraints on applications of the same service and other radiocommunication services that are allocated on a primary basis.

Approach C:

1 that, for the purpose of this Resolution, a sub-orbital vehicle is a vehicle expected to reach the upper atmosphere and may reach space in portions of its flight, without completing a full orbit around the Earth;

*The view was raised that the texts used in the following* resolves *are not compatible with the intention of mandatory actions / operation which are covered in any operative / depository part of any resolution, and consequently, the language used therein needs to be revisited and aligned with the intention / and objectives.*

2 that stations on sub-orbital vehicles may operate in all stages of flight in the aeronautical mobile service (including the aeronautical mobile (R) service), the mobile-satellite service (including the aeronautical mobile-satellite (R) service), or in the radionavigation-satellite service;

3 that, when operating in the aeronautical mobile service (including the aeronautical mobile (R) service), stations on sub-orbital vehicles are subject to the same technical and regulatory conditions as aircraft stations operating in the applicable frequency bands and shall cause no more interference than conventional aircraft stations;

4 that, when operating in the mobile-satellite service (including the aeronautical mobile satellite (R) service) or in the radionavigation-satellite service, stations on board sub-orbital vehicles are subject to the same technical and regulatory conditions as earth stations operating in the applicable frequency bands and shall cause no more interference than conventional earth stations,

**Reasons:** This action clarifies that stations on board sub-orbital vehicles may be terrestrial stations (RR No. **1.62**) and earth stations (RR No. **1.63**) and can be used in all phases of flight, within certain services specified in the Resolution. The stations shall not impose any new constraints on applications of the same service and other radiocommunication services.

Approach D:

1 that, for the purpose of radiocommunications, a sub-orbital flight is described as an intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur beyond the major portion of the Earth’s atmosphere without completing a full orbit (see No. **1.184**) around the Earth, before returning back to the surface of the Earth, and a sub-orbital vehicle is a vehicle executing a sub-orbital flight;

2 that sub-orbital vehicles may use earth stations or aircraft stations and corresponding radio services for the entire duration of flight;

3 that, when operating in the major portion of the Earth’s atmosphere, stations on sub-orbital vehicles are subject to the same technical and regulatory conditions as conventional earth/aircraft stations operating in the applicable frequency bands and shall cause no more interference than conventional earth/aircraft stations;

4 that, when operating beyond the major portion of the Earth’s atmosphere, stations on board sub-orbital vehicles shall not cause harmful interference to, and shall not claim protection from, space stations or terrestrial stations or earth stations operating in the same and adjacent frequency bands,

**Reasons:** This action clarifies that stations on board sub-orbital vehicles may be aircraft stations (RR No. **1.83**) and earth stations (RR No. **1.63**) and corresponding radio services can be used Given that relevant sharing and compatibility studies have not been carried out in this study cycle, the existing space service in the same and adjacent frequency bands shall be protected when stations on board sub-orbital vehicle operate beyond the major portion of the Earth’s atmosphere. Moreover, the stations on board sub-orbital vehicle shall not impose any new constraints on applications of the same service and other radiocommunication services.

Note – The remaining elements are common to all approaches:

instructs the Secretary-General

to bring this Resolution to the attention of ICAO,

*The view was raised that after and if all problems, difficulties and inconsistencies mentioned above are fully resolved*,

invites the International Civil Aviation Organization

to take into account this Resolution in the course of developing SARPs for ICAO systems that may be used by sub-orbital vehicles,

instructs the Director of the Radiocommunication Bureau

to report to future world radiocommunication conferences on any difficulties or inconsistencies encountered in the implementation of this Resolution.

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1. 1 Defined accordingly with the Convention on International Civil Aviation and its annexes. [↑](#footnote-ref-1)