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| **The 4th Meeting of the APT Conference Preparatory****Group for WRC-23 (APG23-4)** | **APG23-4/OUT-13** |
| 15 – 20 August 2022, Bangkok, Thailand | 20 August 2022 |

Working Party 2

**PRELIMINARY VIEWs on WRC-23 agenda item 1.6**

**Agenda Item 1.6:**

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

**1. Background**

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

WRC-23 agenda item 1.6 is intended, among other aspects, to safely integrate sub-orbital vehicles into the airspace used by conventional aircraft and minimize disruption to this controlled airspace during sub-orbital vehicles transition.

In addition, sub-orbital vehicles are intended to operate at higher altitudes than conventional aircraft during short periods of time without permanently entering an orbit as defined in RR No. 1.184 and potentially flying at speeds up to several times the speed of sound.

Relevant ITU-R Recommendations and Reports：

Recommendations

ITU-R [M.1038-0](https://www.itu.int/rec/R-REC-M.1038/en) Efficient use of the geostationary-satellite orbit and spectrum in the 1-3 GHz frequency range by mobile-satellite systems

ITU-R [M.1184-3](https://www.itu.int/rec/R-REC-M.1184/en) Technical characteristics of mobile satellite systems in the frequency bands below 3 GHz for use in developing criteria for sharing between the mobile-satellite service and other services

ITU-R [M.1316-1](https://www.itu.int/rec/R-REC-M.1316/en) Principles and a methodology for frequency sharing in the 1 610.6‑1 613.8 MHz and 1 660-1 660.5 MHz bands between the mobile-satellite service (Earth-to-space) and the radio astronomy service

ITU-R [M.1471-1](https://www.itu.int/rec/R-REC-M.1471/en) Guide to the application of the methodologies to facilitate coordination and use of frequency bands shared between the mobile-satellite service and the fixed service in the frequency range 1-3 GHz

ITU-R [M.1741](https://www.itu.int/rec/R-REC-M.1741/en)-0 Methodology for deriving performance objectives and its optimization for IP packet applications in the mobile-satellite service

ITU-R [M.1787-4](https://www.itu.int/rec/R-REC-M.1787/en) Description of systems and networks in the radionavigation-satellite service (space-to-Earth and space-to-space) and technical characteristics of transmitting space stations operating in the bands 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz

ITU-R [M.1901-3](https://www.itu.int/rec/R-REC-M.1901/en) Guidance on ITU-R Recommendations related to systems and networks in the radionavigation-satellite service operating in the frequency bands 1 164-1 215 MHz, 1 215-1 300 MHz, 1 559-1 610 MHz, 5 000-5 010 MHz and 5 010‑5 030 MHz

ITU-R [M.1903-1](https://www.itu.int/rec/R-REC-M.1903/en) Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) and receivers in the aeronautical radionavigation service operating in the band 1 559-1 610 MHz

ITU-R [M.1905-1](https://www.itu.int/rec/R-REC-M.1905/en) Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) operating in the band 1 164-1 215 MHz

[ITU-R M.1638](https://www.itu.int/rec/R-REC-M.1638/en)-1 Characteristics of and protection criteria for sharing studies for radiolocation (except ground based meteorological radars) and aeronautical radionavigation radars operating in the frequency bands between 5 250 and 5 850 MHz

ITU-R [RS.1260-2](https://www.itu.int/rec/R-REC-RS.1260/en) Feasibility of sharing between active space-borne sensors and other services in the range 420-470 MHz

ITU-R [SA.363-5](https://www.itu.int/rec/R-REC-SA.363/en) Space operation systems

Reports

ITU-R [M.2413-0](https://www.itu.int/pub/R-REP-M.2413-2017) Reception of automatic dependent surveillance broadcast via satellite and compatibility studies with incumbent systems in the frequency band 1 087.7-1 092.3 MHz

ITU-R [M.2477-0](https://www.itu.int/pub/R-REP-M.2477) Radiocommunications for suborbital vehicles

**2. Documents**

The input documents and information documents received at APG23-4 are listed as follows:

* Input Documents: APG23-4/ [INP-08(J)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-08_J-2_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_RES.427.docx), [INP-15(AUS)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-15_AUS_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_Res.427WRC-19.docx), [INP-24(IRN)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-24Rev.1_IRN_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.10_and_1.11.docx), [INP-35(KOR)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-35_KOR_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_and_1.11.docx), [INP-41(CHN)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-41_China_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_Res.427WRC-19.docx) , [INP-56(Singapore)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-56_SNG_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_and_1.9.docx), [INP-60(Samoa)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-60_Samoa_WP2_Preliminary_Views_on_WRC-23_Agenda_Items_1.6_and_1.11.docx)
* Information Documents: APG23-4/ INF-02 (ATU), [INF-03(WMO)](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-03_WMO_Positions.docx), [INF-21(ASMG)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-21_ASMG_Preparation_for_WRC-23.pdf), [INF-28(CITEL)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-28_CITEL_Preparation_for_WRC-23.pdf), [INF-44(RCC)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-44_Status_of_RCC_preparation_to_the_World_Radio_Conference_and_Radio_Assembly_2023.pdf), [[INF-48(CEPT)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-44_Status_of_RCC_preparation_to_the_World_Radio_Conference_and_Radio_Assembly_2023.pdf)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-48_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf), [INF-41(DG Chair)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-41_Brief_on_AI1.6.docx)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Japan**- **Document APG23-4/INP-08**

* Japan supports ITU-R studies of spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations and of appropriate modification, if any, to the Radio Regulations consistent with Resolution 772 (WRC-19).
* When specific frequencies are identified in the future, the protection of existing primary services in the same/adjacent frequency bands should be ensured.

**3.1.2 Australia** - **Document APG23-4/INP-15**

* Australia supports ITU-R studies of regulatory provisions and spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations and of appropriate modification, if any, to the Radio Regulations consistent with Resolution **772 (WRC-19)**. Australia notes that new allocations or changes to the existing allocations in Article 5 are excluded under this agenda item at WRC-23.
* Suborbital vehicles shall ensure protection of, and not impose, any additional constraints on other services or applications services used by conventional aircraft.

**3.1.3 Iran (Republic of) -** **Document APG23-4/INP-24**

* The Republic of Iran supports Method A for the reasons mentioned in discussions part, and due to the fact that Method B referred to three Alternatives which are difficult to implement.

**3.1.4 Korea (Republic of) - Document APG23-4/INP-35**

* The Republic of Korea supports Method B in the draft CPM Text developed by ITU-R WP 5B, which proposes a new WRC Resolution containing the regulatory provisions to operate radiocommunications for sub-orbital vehicles, including definition or description of suborbital vehicle without any changes to the RR.

**3.1.5 China (Republic of) - Document APG23-4/INP-41**

* China supports ITU-R studies of spectrum needs for communications between stations onboard sub-orbital vehicles and terrestrial/space stations and of appropriate modification, if any, to the Radio Regulations consistent with Resolution 772 (WRC-19). When studying appropriate modification to the Radio Regulations, existing services should be properly protected, and new allocations or changes to the existing allocations in Radio Regulations Article 5 are excluded under this agenda item at WRC-23.
* China also supports that a new WRC Resolution should be developed, which contains the provisions to operate radiocommunications for sub-orbital vehicles.

**3.1.6 Singapore (Republic of) - Document APG23-4/INP-56**

* Singapore supports sub-orbital vehicles should be considered as earth stations or terrestrial stations, even if a part of flight occurs temporarily in space. The definition of sub-orbital vehicles should include the operation of any vehicle, including a space launch vehicle, that is 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.
* The development of regulatory conditions should allow sub-orbital vehicles to operate in airspace shared with conventional aircraft, under existing aeronautical regulations. Sub-orbital vehicles may operate in the AM(R)S, MSS and RNSS under the same regulatory conditions as the operation of aircraft stations in those services, using existing coordination processes and procedures.

**3.1.7 Samoa (Independent State of) - Document APG23-3/INP-60**

* Samoa supports the development of a new Resolution at WRC-23 to enable the operation of suborbital vehicles, including launch vehicles and space planes, in specified space and terrestrial services. It’s essential to facilitate the process of such sub-orbital vehicles while ensuring that the current civil aviation and space launch systems are not affected.

**3.2 Summary of issues raised during the meeting**

None.

**4. APT Preliminary View(s)**

* APT Members support ITU-R studies of spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations and of appropriate modification, if any, to the Radio Regulations consistent with Resolution **772 (WRC-19)**.
* APT Members also support that a new WRC Resolution should be developed, which contains the provisions to operate radiocommunications for sub-orbital vehicles and the definition or description of suborbital vehicle.

**5. Other View(s) from APT Members**

* Some APT Members support Method A for the reasons mentioned in discussions within WP5B, and due to the fact that Method B referred to three Alternatives which are difficult to implement.
* Some APT Members are of the views that:
	+ The definition of sub-orbital vehicles should include the operation of any vehicle, including a space launch vehicle, that is 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;
	+ Stations onboard sub-orbital vehicles should be considered as earth stations or terrestrial stations, even if a part of flight occurs temporarily in space;
	+ Sub-orbital vehicles may operate in the AM(R)S, MSS and RNSS under the same regulatory conditions as the operation of aircraft stations in those services, using existing coordination processes and procedures;
	+ The development of regulatory conditions should allow sub-orbital vehicles to operate in airspace shared with conventional aircraft, under existing aeronautical regulations;
	+ Suborbital vehicles shall ensure protection of, and not impose, any additional constraints on other services or applications services used by conventional aircraft.
* Some APT Members are of the view that the definition of sub-orbital vehicle could be made to Article 1 or Article 4 of Radio Regulations, as appropriate.

**6. Issues for Consideration at Next APG Meeting**

APT Members are encouraged to contribute their views, taking into account ITU-R studies and the APT preliminary views, and submit contributions to the next APG meeting (APG23-5).

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG**

* There is no objection to developing regulatory procedures to facilitate the operation of sub-orbital vehicles, while ensuring that they do not affect the systems of civil aviation and the current space launch system.
* No change in Article 5 of the Radio Regulations.
* Follow-up studies in the radio sector.

**7.1.2 ATU**

* Support the ongoing ITU-R studies to develop regulatory provisions to facilitate the operation of sub-orbital vehicles, while ensuring the protection of current civil aviation, space launch systems and radio astronomy.
* Note and recall that the scope of this agenda item excludes any new allocations or changes to the existing allocations in Article 5.

**7.1.3 CEPT**

* CEPT is of the view that the definition of sub‐orbital flight 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” may need to be adjusted and should be included in the resolves part of a new WRC Resolution.
* CEPT is of the view that:
	+ stations on board sub‐orbital vehicles are allowed to operate as terrestrial stations or as Earth stations when a portion of the flight path occurs in space;
	+ the stations of the sub-orbital vehicles that will have at least one phase of their flight occurring in airspace shared with other aircraft shall be operated for their safety purpose in the same radiocommunication services and the same frequency bands as the ones for conventional aircraft;
	+ other types of sub-orbital vehicles that fly in non‐shared airspace may use relevant radiocommunication services during all phases of flight.
* The sub-orbital vehicles shall ensure the protection and not impose any additional constraint on other services or applications operated in the same service than conventional aircraft. The suborbital vehicles shall not impact the radiocommunications of conventional satellite launchers.

**7.1.4 CITEL**

* Some administrations consider to pursue studies called for by Resolution 772 (WRC-19) as a basis for possible new regulatory provisions to support the growing radiocommunications needs of sub-orbital vehicles. These studies should address maintaining a safe and efficient airspace for all users, avoiding harmful interference to other radiocommunication services in the same and adjacent frequency bands and to existing applications of the same service in which stations on board sub-orbital vehicles operate, and avoidance of adverse impact on conventional space launch systems.
* One administration is of the view that it is necessary to identify regulatory a mechanism in order to include the applications of mobile satellite, aeronautical mobile, space operation, radionavigation, and radionavigation satellite service to be used by stations on board sub-orbital vehicles for the entire duration of the flight.

**7.1.5 RCC**

* The RCC Administrations consider that, since the stations on board sub-orbital vehicles shall provide voice/data communications, navigation, surveillance, telemetry, tracking and command, they shall operate only within the current frequency allocations to:
	+ the aeronautical mobile (OR) service;
	+ mobile, except aeronautical mobile on route (R) service;
	+ aeronautical radionavigation service;
	+ mobile satellite, except for aeronautical mobile satellite on route (R);
	+ radionavigation satellite services,
	+ as well as the space operation service, depending on the transmitted information.
* The RCC Administrations also consider that stations on board a sub-orbital vehicle shall ensure its safe flight in international airspace and its interoperability with civil aviation systems, moreover, these stations shall not cause unacceptable interference to the operation of stations on board launch vehicles.

**7.2 International Organisations**

**7.2.1 ICAO**

* To support ITU-R studies and the definition of relevant technical characteristics as called for by Resolution **772 (WRC-19)** to ensure aviation needs are satisfied.
* To support, if identified as required by the studies called for in Resolution **772 (WRC-19)**, modifications to the Radio Regulations that help enable the integration of sub-orbital vehicles into the airspace structure.
* To support, if studies show the need for access to additional spectrum, the establishment of a WRC agenda item at a future competent conference.

**7.2.2 SFCG**

* SFCG supports studies in the ITU-R with the objective to develop regulatory provisions for radiocommunications for sub-orbital vehicles in order to facilitate the safe integration of sub-orbital vehicles into the existing air traffic management system.
* Any negative impact on EESS, SOS, SRS and MetSat operations must be avoided. It is also important that any regulatory changes associated with this agenda item will not adversely impact the operation of launch vehicles or sounding rockets.

**7.2.3 WMO**

* WMO supports studies on the development of regulatory provisions to meet the requirements of sub-orbital vehicle operations but would be opposed to provisions that have a negative impact to current and future MetSat and EESS operations.

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