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| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-5)** | **APG23-5/OUT-12 (Rev.1)** |
| 20 – 25 February 2023, Busan, Republic of Korea | 25 February 2023 |

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.

Sub-orbital vehicles are intended to operate at higher altitudes than conventional aircraft during short periods of time without reaching an orbit. 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.

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 APG23-5 are listed as follows:

* Input Documents: APG23-5/[INP-09](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-09_Thailand-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_and_1.11.docx) (THA), [INP-15](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-15_Japan-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_RES.427.docx) (J), [INP-37](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-37_Iran-WP2-Preliminary_Views_on_WRC_23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_and_1.11.docx) (IRN) , [INP-43](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-43_Iran-WP2-Proposed_modification_to_the_Chapter_2_of_draft_CPM_Report.docx) (IRN), [INP-47](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-47_Singapore-WP2-Preliminary_Views_on_WRC_23_Agenda_Items_1.6_and_1.11.docx) (SNG), [INP-57](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-58_Australia-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1https:/www.apt.int/sites/default/files/2023/02/APG23-5-INP-57_Australia-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.61.8_1.9_1.10_1.11_and_Res.427WRC-19.docxTopics_a_and_d.docx) (AUS), [INP-64](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-65_Rep_of_Korea-WP3-Preliminary_Views_on_WRC-23_Agenda_Itemhttps:/www.apt.int/sites/default/files/2023/02/APG23-5-INP-64_Rep_of_Korea-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.81.9_1.10_and_1.11.docxs_1.12_1.13_1.14_and_9.1Topics_a_and_d.docx) (KOR), [INP-89](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-89_China-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_RES.427.docx) (CHN)
* Information Documents: APG23-5/[INF-0](https://www.apt.int/sites/default/files/2023/01/APG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx)1(WMO), [INF-22](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-22_Brief_on_AI_1.6.docx) (DG Chair), [INF-39](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf) (CEPT), [INF-43](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf) (CITEL), [INF-45](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-45_Status_of_RCC_preparation_to_the_WRC-23.pdf) (RCC)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Thailand (Kingdom of)- Document APG23-5/**[**INP-09**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-09_Thailand-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_and_1.11.docx)

* Thailand supports Method B in the current draft CPM text, in order to develop a new WRC Resolution containing the provisions to operate radiocommunications for on board sub-orbital vehicles.
* Thailand is of the view that the radiocommunications operating on board sub-orbital vehicles should ensure protection and not impose any additional constraint on the existing services in the frequency bands to be used by sub-orbital vehicles and, as appropriate, in adjacent frequency bands.

**3.1.2 Japan**- **Document APG23-5/**[**INP-15**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-15_Japan-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_RES.427.docx)

* Japan supports further 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 in accordance to 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.

**3.1.3 Iran (Republic of) - Document APG23-5/**[**INP-37**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-37_Iran-WP2-Preliminary_Views_on_WRC_23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_and_1.11.docx)

* The Republic of Iran support Method A for the reasons mentioned in Discussion Parts, and due to the fact that Method B referred to three alternatives which includes serious ambiguities and inconsistencies at this stage.

**3.1.4 Singapore (Republic of) - Document APG23-5/**[**INP-47**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-47_Singapore-WP2-Preliminary_Views_on_WRC_23_Agenda_Items_1.6_and_1.11.docx)

Singapore supports Method B Approach C of the draft CPM Report,

* the 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.

**3.1.5 Australia** - **Document APG23-5/**[**INP-57**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-58_Australia-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1https:/www.apt.int/sites/default/files/2023/02/APG23-5-INP-57_Australia-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.61.8_1.9_1.10_1.11_and_Res.427WRC-19.docxTopics_a_and_d.docx)

* Australia supports continuation of the current operations of stations on-board sub-orbital vehicles whereby they may be terrestrial stations (No. 1.62) and earth stations (No. 1.63) and can be used in all phases of flight, within their respective service allocations.
* Suborbital vehicles shall ensure protection of, and not impose, any additional constraints on other services or applications services used by conventional aircraft.
* Australia is of the view that no changes to Article 5 of the Radio Regulations are required to satisfy this agenda item.

**3.1.6 Korea (Republic of) - Document APG23-5/**[**INP-64**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-65_Rep_of_Korea-WP3-Preliminary_Views_on_WRC-23_Agenda_Itemhttps:/www.apt.int/sites/default/files/2023/02/APG23-5-INP-64_Rep_of_Korea-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.81.9_1.10_and_1.11.docxs_1.12_1.13_1.14_and_9.1Topics_a_and_d.docx)

* The Republic of Korea supports Method B in the draft CPM Report, which proposes a new WRC Resolution containing the regulatory provisions to operate radiocommunications for sub-orbital vehicles, including definition or description of sub-orbital vehicle without any changes to the Articles of the RR. The Republic of Korea is of the view that supporting one of approaches in Method B needs further consideration.

**3.1.7 China (Republic of) - Document APG23-5/**[**INP-89**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-89_China-WP2-Preliminary_Views_on_WRC-23_Agenda_Items_1.6_1.7_1.8_1.9_1.10_1.11_and_RES.427.docx)

China is of the view that a new WRC Resolution should be developed, which contains:

* Definition or description of sub-orbital flight and sub-orbital vehicle.
* The identification of the specific services in which sub-orbital vehicles may operate (AM(R)S, MSS, RNSS and potentially others) and to clarify that stations onboard sub-orbital vehicles may operate as aircraft stations or earth stations in those services. The RR No. 4.4 shall be applied when the above services are used by stations onboard sub-orbital vehicles in space.
* The requirement that the operation of stations on sub-orbital vehicles in the above services is under the same conditions as those for conventional stations.
* The sub-orbital vehicles shall ensure that it does not affect the existing civil aviation and space launch systems, and not impose any additional constraint on other services or applications operated in the same service.

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

At the APG23-5 meeting, one INP document regarding proposed modification to the Chapter 2 of the draft CPM Report was received. APT Members considered this document, and invite the APT Member to submit the proposal to CPM23-2 meeting individually.

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

APT Members prefer Method B to address this agenda item, but are still considering approaches in Method B of the draft CPM Report.

APT Members are of the view that a new WRC Resolution should be developed, which contains the regulatory provisions to operate radiocommunications for sub-orbital vehicles:

* The definition or description of sub-orbital flight and sub-orbital vehicle should be provided;
* It is not clear at this stage whether stations associated with onboard sub-orbital vehicles should be considered as an earth station or a terrestrial station or an aircraft station which could operate in the AM(R)S, MSS and RNSS under the same conditions as those for conventional stations;
* The sub-orbital vehicles shall ensure that it does not affect the existing civil aviation and space launch systems, and not impose any additional constraint on other services or applications operated in the same services.

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

Some APT Members support Method A for the reasons that Method B refers to three alternatives which includes serious ambiguities and inconsistencies at this stage.

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;
* Continuation of the current operations of stations on-board sub-orbital vehicles whereby they may be terrestrial stations (No. **1.62**) and earth stations (No. **1.63**) and can be used in all phases of flight, within their respective service allocations;
* The development of regulatory conditions should allow sub-orbital vehicles to operate in airspace shared with conventional aircraft, under existing aeronautical regulations;
* Stations onboard sub-orbital vehicles may operate as terrestrial stations or earth stations in their corresponding services, and the RR No. **4.4** shall be applied when those services are used by stations onboard sub-orbital vehicles beyond the major part of atmosphere;
* No changes to Article **5** of the Radio Regulations are required to satisfy this agenda item.

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

APT Members are encouraged to contribute to the next APG meeting on agenda item 1.6, taking into account the outcomes of CPM23-2 and APG23-5 meetings.

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG** - **Document APG23-5/**[**INF-22**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-22_Brief_on_AI_1.6.docx)

* Follow the ongoing studies on the development of a new WRC-23 Resolution containing regulatory provisions to facilitate the operation of sub-orbital vehicles, and ensure that it does not affect the existing civil aviation and space launch systems, and doesn’t impose any new restrictions on other co-primary services and applications.
* The necessity to agree on specific definition for sub-orbital vehicles and to regulate their trajectories starting from launch to landing on the ground.
* No change in Article 5 of the Radio Regulations.

**7.1.2 ATU** - **Document APG23-5/**[**INF-22**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-22_Brief_on_AI_1.6.docx)

* 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** - **Document APG23-5/**[**INF-39**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf)

CEPT is of the view that a new WRC Resolution is required that:

* provides the conditions for the operation of terrestrial stations and earth stations fitted on board suborbital vehicles;
* decides which of the terrestrial stations and earth stations on board a sub-orbital vehicle are required to ensure the safe integration in aviation airspace under the following conditions:
  + that using only aviation systems standardized by ICAO;
  + that these stations on board sub-orbital vehicles shall not impose any additional constraint than aircraft on other services or applications operated in the same service, and in adjacent band;
  + that these stations on sub-orbital vehicles shall not impact the radiocommunications of satellite launchers which operate in the space operation service.

**7.1.4 CITEL** - **Document APG23-5/**[**INF-43**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf)

A number of Administrations propose the following modifications:

* ADD RESOLUTION [A16] Regulatory provisions for the operation of radiocommunications on sub-orbital vehicles - proposed new Resolution is in accordance with Approach B of Method B contained in the draft CPM text prepared by WP 5B
* ADD 43.XX – proposed new provision to Article 43 of the RR provides the necessary reference within the Radio Regulations to the above proposed new Resolution.
* SUP RESOLUTION 772 (WRC-19) – Consequential to the results of studies at ITU-R in relation to this Resolution
* The proposed approach clarifies that stations on-board sub-orbital vehicles may be terrestrial station or earth station or both, and can be used in all phases of flight maintaining the same class of station within their respective service allocation.

**7.1.5 RCC** - **Document APG23-5/**[**INF-45**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-45_Status_of_RCC_preparation_to_the_WRC-23.pdf)

* 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:
  + aeronautical mobile service;
  + aeronautical radionavigation service;
  + aeronautical mobile satellite service;
  + radionavigation satellite services;
  + the space operation service.
* 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.
* The RCC Administrations consider the need to proceed with the studies under possible agenda item of WRC-27 based on modified Resolution 772 (WRC-19)

**7.2 International Organisations**

**7.2.1 ICAO** - **Document APG23-5/**[**INF-22**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-22_Brief_on_AI_1.6.docx)

* 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** - **Document APG23-5/**[**INF-22**](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-22_Brief_on_AI_1.6.docx)

* 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** - **Document APG23-5/**[**INF-0**](https://www.apt.int/sites/default/files/2023/01/APG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx)**1**

* WMO supports the development of regulatory provisions to facilitate sub-orbital vehicle operations but would be opposed to provisions that have a negative impact to current and future MetSat and EESS operations. In particular, Method B, Approach A of the Draft CPM text produced by WP 5B with WMO objectives.

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