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|  | ASIA-PACIFIC TELECOMMUNITY | **Document No:** |
| **The 4th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-4)** | **APG23-4/OUT-24**  **(Rev.1)** |
| 15 – 20 August 2022, Bangkok, Thailand | 20 August 2022 |

Working Party 3

**PRELIMINARY VIEWs on WRC-23 agenda item 9.1 (topic a))**

**Agenda Item 9.1:**

*9.1 on the activities of the ITU Radiocommunication Sector since WRC 19:*

*– In accordance with Resolution* ***657 (Rev. WRC 19)****, review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;*

**1. Background**

Space weather refers to the physical processes occurring in the space environment that ultimately affects human activities on Earth and in space. Space weather is influenced by the X-ray, ultraviolet (UV), high energic particles and strong solar wind generated by Coronal Mass Ejection (CME). Space weather observations are important for detecting and forecasting solar activity events that impact services critical to the economy, safety and security of administrations and their population. These observations are made from ground-based and space-based systems. Some of the sensors operate by receiving signals of opportunity, including low-level natural emissions of the Sun, Earth’s atmosphere and other celestial bodies, and therefore may suffer harmful interference at levels which could be tolerated by other radio systems. However, no frequency bands have been documented in the Radio Regulations for space weather sensor applications.

Agenda item 9.1, topic a) was therefore established with a view to describing appropriate recognition and protection of space weather sensors in the Radio Regulations (RR) without placing additional constraints on incumbent services.

ITU-R Working Party (WP) 7C is designated as the responsible group for this topic and has undertaken the study of the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors in response to Resolution **657 (Rev.WRC-19)**.

WP 7C is developing a provisional draft CPM text (Annex 14 to Chairman’s Report (Doc. [7C/361](https://www.itu.int/md/R19-WP7C-C-0361/en))), which provides possible approaches on how to address agenda item 9.1, topic a) as follows.

* To achieve recognition for space weather observations, a definition for space weather should be included in RR Article **1**, with a draft text “*space weather:* information relating to the characteristics of natural phenomenon in space and in high atmosphere that impact Earth’s environment and human activities.”
* The definition of the meteorological aids service (MetAids) has the flexibility to encompass all space weather sensors (receive-only and active) and therefore it is proposed to create a subset of the MetAids, called the MetAids (space weather), under which space weather sensors are allowed to operate through a new provision of RR Article **4**.
* To ensure the operation of space weather sensors, it is necessary to add new allocations to the MetAids (space weather) service. However, modifications of RR Article **5** through this topic of agenda item 9.1 might be difficult and it will be necessary to elaborate a new agenda item for the protection of space weather stations for the WRC-27 agenda based on provisional agenda item 2.6 in Resolution **812** **(WRC-19)**.

WP 7C is developing the following documents, which are attached as annexes to Chairman’s Report (Doc.7C/[361](https://www.itu.int/md/R19-WP7C-C-0361/en)).

* revision of Report ITU-R [RS.2456-0](https://www.itu.int/pub/R-REP-RS.2456-2019), which summarizes the current status of operational space weather sensor systems (Annex 13)
* a new ITU-R Report on receive-only space weather sensor spectrum use (Annex 12)
* a new ITU-R Report on interference criteria of receive-only space weather sensor (Annex 11)
* a new ITU-R Report on active space weather sensor spectrum requirements (Annex 10)
* a document regarding WP7C views (or “Elements”) on this agenda item (Annex 15)
* a draft CPM text (Annex 14)

(*Editorial notes: Refer to plenary if the list of relevant ITU-R Documents should be retained or removed*)

**2. Documents**

* Input Documents APG23-4/ INP-[09](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-09_J-3_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1.A_9.1.D_and_RES.655.docx) (J), [16](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-16_AUS_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topics_a_and_d.docx) (AUS), [25](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-25_IRN_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.13_and_9.1Topic_a.docx) (IRN), [36](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-36_KOR_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a_and_d.docx) (KOR), [42](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-42_China_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topic_a_and_d.docx) (CHN),   
  [47](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-47_Thailand_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.13_and_9.1Topic_a.docx) (THA), [63](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-63_India_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topic_a_and_d.docx) (IND)
* Information Documents APG23-4/ INF-[02](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-02_ATU_preparation.docx) (ATU), [03](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-03_WMO_Positions.docx) (WMO), [09](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-09_Brief_on_AI9.1.a.docx) (DG Chair),   
  [21](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-21_ASMG_Preparation_for_WRC-23.pdf) (ASMG), [27](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-27_IARU_Views_on_WRC-23_Agenda_Items_1.2_1.12_1.14_1.18_and_9.1_Topic_a_and_b.docx) (IARU), [28](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-28_CITEL_Preparation_for_WRC-23.pdf) (CITEL), [44](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) (RCC), [48](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-48_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf) (CEPT)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Australia** - **Document APG23-4/INP-**[**16**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-16_AUS_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topics_a_and_d.docx)

Australia supports studies addressing space weather sensors with a view to ensuring the Radio Regulations include appropriate recognition and future protection for space weather sensors. These studies should ensure that additional constraints are not placed on incumbent services.

**3.1.2 China (People's Republic of)** - **Document APG23-4/INP-**[**42**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-42_China_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topic_a_and_d.docx)

China supports the existing APT Preliminary Views from APG23-3 meeting, and China also supports the studies addressing space weather sensors with a view to ensuring the Radio Regulations include appropriate recognition and modification of RR Article 1 and Article 4.

**3.1.3 India (Republic of)** - **Document APG23-4/INP-**[**63**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-63_India_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1Topic_a_and_d.docx)

India considers it necessary to develop appropriate recognition of space weather sensors in the Radio Regulations and determine the appropriate radio service for space weather sensors. India supports further study on spectrum requirements and the relevant interference criteria for space weather sensors, without any additional adverse effects on existing services to which the same and adjacent frequency bands are allocated.

**3.1.4 Iran (Islamic Republic of)** - **Document APG23-4/INP-**[**25**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-25_IRN_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.13_and_9.1Topic_a.docx)

The Administration of the I.R. Iran proposes that the following view be adopted as APT Preliminary Views:

* APT Members support ITU-R studies relating to the identification of space weather sensors, their technical and operational characteristics, spectrum requirements and appropriate radio service designations with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services.
* APT Members are of the view that any changes to the Radio Regulations are out of the scope of Agenda item 9.1. Therefore, any changes to the Radio Regulations such as recognition in the Radio Regulations of space weather sensors, determination of the appropriate service(s) in line with the space weather definition, and identification of frequency bands used for providing data critical for space weather forecasting/warnings and that will require protection need to be well studied and done through a possible new agenda item for WRC-27 in line with the preliminary agenda approved by WRC-19 (agenda item 2.6 of Resolution **812 (WRC-19)**).

**3.1.5 Korea (Republic of)** - **Document APG23-4/INP-**[**36**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-36_KOR_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a_and_d.docx)

The Republic of Korea supports a new definition for space weather in Article 1 of the Radio Regulations.

The Republic of Korea is of the view that any decision on the designation of space weather as an application of certain radiocommunication services should not impact on the continuation of any space weather observation currently conducted under the radio astronomy service.

**3.1.6 Japan** - **Document APG23-4/INP-**[**09**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-09_J-3_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1.A_9.1.D_and_RES.655.docx)

Space weather observations are vital for a wide range of areas, including stable use of radio in telecommunications, broadcasting, and positioning, as well as electric power grids, aviation and space applications, and their necessity is further increasing in the evolving ICT society. Japan supports ITU-R studies on space weather sensors being conducted concerning appropriate recognition and protection thereof. For the recognition, Japan considers it necessary to develop appropriate recognition of the space weather sensors in the Radio Regulations (RR) and determine the appropriate radio service for space weather sensors. For protection, Japan supports further study on spectrum requirements and the relevant interference criteria for space weather sensors, without any additional adverse effects on existing services to which the same and adjacent frequency bands are allocated.

**3.1.7 Thailand (Kingdom of)** - **Document APG23-4/INP-**[**47**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-47_Thailand_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.13_and_9.1Topic_a.docx)

Thailand supports an appropriate recognition of space weather sensors in the Radio Regulations with due consideration given to the technical and operational characteristics, spectrum requirements, and protection without imposing additional constraints on existing services.

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

The APT preliminary views below were developed in the drafting group based on the preliminary views from APT Members.

Some APT Members expressed their views that any changes to the Radio Regulations are out of the scope of Agenda item 9.1.

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

APT Members support the ITU-R studies relating to the identification of space weather sensors, their technical and operational characteristics, spectrum requirements and appropriate radio service designations with a view to describing appropriate recognition, including a definition for space weather in Article **1** of the Radio Regulations**.**

Should the preliminary agenda of WRC-27 include space weather as an agenda item, it is necessary that studiesinclude, inter alia, protection of services to which the band is allocated as well as services in the adjacent band.

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

Some APT Members support no changes to the Radio Regulations under Agenda item 9.1, topic a).

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

APT Members are encouraged to contribute to the next APG meeting for further consideration on agenda item 9.1, topic a), taking into account the progress of ITU-R studies, especially with respect to the possible definition of space weather, the possible designation of MetAids (space weather) for space weather observation, treatment of the current space weather observation under radio astronomy service, whether changes to the Radio Regulations are out of the scope of Agenda item 9.1, and the possible inclusion of the space weather topic in the WRC-27 agenda.

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG** - **Document APG23-4/INF-**[**21**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-21_ASMG_Preparation_for_WRC-23.pdf)

Support studies to identify priority bands that provide necessary data for recognition and protection of space weather systems and to develop appropriate definitions in the Radio Regulations (RR) used by space weather sensors without imposing any additional restrictions on existing services.

**7.1.2 ATU** - **Document APG24-4/INF-**[**02**](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-02_ATU_preparation.docx)**, APG23-3/INF-39**

Support the recognition and protection of the application given the importance of space weather system in human welfare and national security while ensuring that services, in the identified Broadcasting, Broadcasting and Fixed satellites, Radio Astronomy and other incumbent service are protected.

**7.1.3 CEPT** - **Document APG23-4/INF-**[**48**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-48_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf)

CEPT supports that the following definition for space weather is included in Article **1**, section VIII, of the Radio Regulations:

*space weather: information relating to the characteristics of natural phenomena occurring in space and in high atmosphere that impact Earth’s environment and human activities.*

CEPT also supports the:

* Designation of space weather (active and receive‐only) as an application of the MetAids service, operated under a subset of this service called MetAids (space weather);
* Recognition in the Radio Regulations of specific usage through Article **4** (space weather sensors) in order to extend MetAids applications to space weather;
* Identification of priority frequency bands used for providing data critical for space weather forecasting/warnings that will require protection.

In addition, CEPT supports the further processing of the related work under an agenda item of WRC‐27 ‐ see preliminary agenda item 2.6 in Resolution **812 (WRC‐19)**.

Finally, CEPT supports the development of ITU‐R Recommendation(s) to provide the relevant protection criteria for receive‐only and active space weather sensors

**7.1.4 CITEL** - **Document APG23-4/INF-**[**28**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-28_CITEL_Preparation_for_WRC-23.pdf)

* One administration is of the view that changes to the Radio Regulations are outside the scope of Agenda Item 9.1. The United States supports conducting the studies called for in Resolution **657 (Rev.WRC-19)** and will contribute to the work required under the Resolution.
* A second administration, due to its close proximity to the north magnetic pole and the auroral zone (geomagnetic activity is especially strong in the auroral zones), is among the countries most affected by space weather. Therefore, this administration supports the studies in the ITU-R in accordance with in Resolution **657 (Rev.WRC-19)** to:
  + Develop appropriate description of how recognition could be made in the Radio Regulations (RR) for frequency bands used by space weather sensors without placing additional/undue constraints on incumbent services;
  + Establish through studies which frequency bands provide data critical for space weather forecasting/warnings.

**7.1.5 RCC** - **Document APG23-4/INF-**[**44**](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)

The RCC Telecommunication Administrations are of the view that, the space weather sensors may be considered as application of the Meteorological aids service (MetAids).

The RCC Telecommunication Administrations are of the view that, it is not allowed to use the space weather sensors without determining the frequency bands within *MetAids* allocations for such applications in the Radio Regulations.

The RCC Telecommunication Administrations are of the view that, changes to the RR Articles 1, 4 and 5 can be made only based on outcomes of studies, carried out under agenda item of future WRC.

**7.2 International Organisations**

**7.2.1 IARU** - **Document APG23-4/INF-**[**27**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-27_IARU_Views_on_WRC-23_Agenda_Items_1.2_1.12_1.14_1.18_and_9.1_Topic_a_and_b.docx)

The IARU notes that the scope of Resolution 657 is very broad. The systems described in Report ITU-R RS.2456-0 utilize radio frequencies from 13 kHz up to at least 15 GHz.

A significant proportion of amateur activity is directly affected by daily and longer-term variations in space weather. Consequently, amateurs have a significant interest in space weather and its impact on the ionosphere and radio wave propagation. At the same time, the amateur and amateur-satellite services are incumbent services with allocations in frequency bands ranging from 135.7 kHz to 250 GHz.

In considering potential new regulatory provisions for the recognition of space weather systems, additional constraints on incumbent services including the amateur and amateur satellite services must be avoided.

IARU will monitor developments in WP 7C and will contribute to inputs via WP 5A.

**7.2.2 WMO - Document APG23-4/INF-**[**03**](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-03_WMO_Positions.docx)

WMO supports ensuring the protection of space weather sensors that use radio spectrum and will contribute to the corresponding studies.

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