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|  | ASIA-PACIFIC TELECOMMUNITY | **Document No:** |
| **The 2nd Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-2)** | **APG23-2/OUT-24** |
| 19 – 23 April 2021, Virtual/Online Meeting | 23 April 2021 |

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 without placing additional constraints on incumbent services.

In this regard, Resolution [**657 (Rev.WRC-19)**](https://www.itu.int/dms_pub/itu-r/oth/0c/0a/R0C0A00000D0022PDFE.pdf)“Protection of radio spectrum-reliant space weather sensors used for global prediction and warnings”invites ITU-R to identify specific space weather sensors which need to be protected by appropriate regulation; conduct any necessary sharing studies with incumbent systems operating in frequency bands used by space weather sensors with the objective of determining potential regulatory provisions that can be provided to receive-only operational space weather sensors for their appropriate recognition in the Radio Regulations, while not placing additional constraints on incumbent services; develop potential solutions to describe in the Radio Regulations, in Articles **1** and **4**, and/or as a WRC Resolution, if deemed appropriate, space weather sensor systems and their corresponding usage, as well as protection requirements for receive-only space weather sensors; and conduct studies on the technical and operational characteristics of active space weather sensors and conduct necessary sharing studies with incumbent systems operating in frequency bands used by active space weather sensors, with the objective of determining the appropriate radiocommunication service for those sensors.

ITU-R Working Party (WP) 7C is designated as the responsible group for this topic. In the previous study cycle, Report ITU-R [RS.2456-0](https://www.itu.int/pub/R-REP-RS.2456-2019) was developed, which summarizes the current status of operational space weather sensor systems. At the WP 7C meeting held in September/October 2020, the work plan was updated for this topic and attached to the Chairman’s Report (Doc. [7C/105](https://www.itu.int/md/R19-WP7C-C-0105/en) Annex 6). Two working documents towards ITU-R Reports on space weather sensor spectrum requirements and on space weather sensor interference criteria were developed and attached to the Chairman’s Report for further work at future meetings (Doc. 7C/105 Annexes 8 and 9), respectively. In addition, a preliminary draft revision of the Report ITU-R RS.2456 “Space weather sensor systems using radio*”* was developed and attached to the Chairman’s Report (Doc. 7C/105 Annex 7).

**2. Documents**

* Input Documents APG23-2/INP-12(J), 26(AUS), 32(KOR), 41(INS)
* Information Documents APG23-2/INF-23(IARU), 25(ASMG), 35(CEPT)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Japan** - **Document APG23-2/INP-12**

Japan supports ITU-R studies on space weather sensors being conducted concerning appropriate recognition and protection thereof. For this, Japan considers it necessary to select the essential observation for space weather monitor and forecast from the comprehensive list in Report ITU-R RS.2456 with clear priority.

With respect to passive radio observation, Japan proposes Table 1(Note) as the selected list for monitoring space weather condition. This table takes into account those that are highly used and operational for space weather monitoring/forecasting within the international collaboration framework e.g., ICAO, ISES.

In addition, Japan believes that WRC-23 should consider first the protection and recognition of passive measurement, since passive observation treats weaker signals comparing with active measurements.

Note: See APG23-2/INP-12 for details.

**3.1.2 Australia** - **Document APG23-2/INP-26**

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.

**3.1.3 Korea (Republic of)** - **Document APG23-2/INP-32**

The Republic of Korea is of the view that specific space weather sensors need to be identified for protection by appropriate regulatory provisions and the potential regulatory provisions should not place additional constraints on incumbent services.

**3.1.4 Indonesia (Republic of)** - **Document APG23-2/INP-41**

Indonesia is of the view to support studies by ITU-R 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.

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

No significant issues were raised.

**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 and protection in the Radio Regulations without placing additional constraints on incumbent services.

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

None

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

APT Members are encouraged to contribute to the next APG meeting for further consideration on the Agenda item 9.1, topic a, taking into account the progress of ITU-R studies.

**7. Views from Other Organisations**

**7.1 Regional Groups**

**7.1.1 ASMG** - **Document APG23-2/INF-25**

Follow-up the studies under this agenda item without imposing any restrictions on existing services.

**7.1.2 ATU** - **Document APG23-2/INF-26**

To be developed

**7.1.3 CEPT** - **Document APG23-2/INF-35**

CEPT supports:

* The identification of priority frequency bands which provide data critical for space weather forecasting/warnings;
* Development of appropriate recognition in the Radio Regulations (RR) for frequency bands used by space weather sensors without placing additional constraints on incumbent services.

**7.1.4 CITEL** - **Document APG23-2/INF-34**

To be developed

**7.1.5 RCC** - **Document APG23-2/INF-36**

To be developed

**7.2 International Organisations**

**7.2.1 IARU** - **Document APG23-2/INF-23**

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 APG23-1/INF-05**

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

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