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| **The 3rd Meeting of the APT Conference Preparatory Group for WRC-23 (APG23-3)** | **APG23-3/OUT-21** |
| 8 – 13 November 2021, Virtual/Online Meeting | 13 November 2021 |

Working Party 3

**PRELIMINARY VIEWs on WRC-23 agenda item 1.12**

**Agenda Item 1.12:**

*to conduct, and complete in time for WRC 23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution* ***656 (Rev.WRC-19)****;*

**1. Background**

This agenda item originated from the USA (a CITEL member administration).

There is an interest among climate researchers in remote sensing of the Earth’s subsurface with the intent of locating water/ice/deposits and examining sub-ice glacial bed surfaces using active spaceborne sensors. This information can help to understand the global thickness, inner structure, and the thermal stability of the Earth’s ice sheets as an observable parameter of Earth climate evolution. The 40-50 MHz frequency range is preferable to satisfy all requirements for spaceborne radar sounders and a bandwidth of 10 MHz is sufficient for use.

ITU-R Recommendation [RS.2042-1](https://www.itu.int/rec/R-REC-RS.2042/en) titled “Typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz band” was completed during the WRC-19 study cycle. This recommendation indicates that:

* operations of spaceborne radar sounder with other primary and secondary services would be under RR No. **4.4**, non-interference basis and shall not cause harmful interference to, and shall not claim protection;
* that operational limitations have been identified to allow operation under RR No. **4.4** on a non-interference basis such as operating only in either uninhabited or sparsely populated areas of the ice sheets of Greenland and Antarctica and deserts of northern Africa and the Arabian Peninsula and operating the radar at night-time only from 3 a.m. to 6 a.m. locally

The spaceborne active sensor is expected to be carried on a low-Earth orbiting satellite at an altitude of 400 km, an inclination optimized for a sun synchronous orbit. The number of spaceborne radar sounder missions operating simultaneously is expected to remain very low; perhaps only one, or two.

Work is currently ongoing in ITU-R Working Party 7C (WP 7C, the responsible group) on revisions to Report ITU-R RS.2455, Recommendation ITU-R RS.2042 and the development of draft CPM text.

1. Draft CPM Text – drafting is at a preliminary stage with the document currently containing a draft executive summary, background, and section headers for the various anticipated study results.
2. Revision of ITU-R Report RS.2455 – At the most recent (September 2021) meeting of WP 7C significant progress was made on the revision of this report. All previous static RFI analyses have been removed and replaced entirely with dynamic analyses. The IARU noted at the meeting that it will continue to work with the United States to seek increased protections for out-of-band (50-54 MHz) amateur weak signal research. This is likely to include a replacement of the static analysis noted above with a dynamic analysis using a radar sounder emission attenuation of 20dB versus the figure of 30dB that was used in the static analysis.
3. Revision of ITU-R Recommendation RS.2042 – at the September 2021 meeting of WP 7C work commenced on a revision of ITU-R Recommendation RS.2042. This working document is based on a contribution from the European Space Agency with the initial proposed revisions consistent with the ongoing updates to ITU-R Report RS.2455 noted above.

Relevant ITU-R documents:

1. ITU-R Recommendation [RS.2042-1](https://www.itu.int/rec/R-REC-RS.2042/en) - “Typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz band”.
2. ITU-R Report [RS.2455-0](https://www.itu.int/pub/R-REP-RS/publications.aspx?lang=en&parent=R-REP-RS.2455) – “Preliminary results of sharing studies between a 45 MHz radar sounder and incumbent fixed, mobile, broadcasting and space research services operating in the 40-50 MHz frequency range”.
3. ITU-R Document [7C/283 Annex 4](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0283!N04!MSW-E.docx) – preliminary draft revised Report ITU-R RS.2455-1 (from the WP 7C September 2021 meeting).
4. ITU-R Document [7C/283 Annex 5](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0283!N05!MSW-E.docx) – Working document towards preliminary draft revised Recommendation ITU-R RS.2042-1 (from the WP 7C September 2021 meeting).
5. ITU-R Document [7C/283 Annex 6](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0283!N06!MSW-E.docx) – draft CPM text for WRC-23 agenda item 1.12 (from the WP 7C September 2021 meeting).

**2. Documents**

* Input Documents: APG23-3/[INP-09(AUS)](https://www.apt.int/sites/default/files/2021/10/APG23-3-INP-09_AUS_contribution_for_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1_Topics_a_and_d.docx), [INP-17(INS)](https://www.apt.int/sites/default/files/2021/10/APG23-3-INP-17_Indonesia-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_and_9.1_Topics_a.docx), [INP-26(KOR)](https://www.apt.int/sites/default/files/2021/11/APG23-3-INP-26_WP3_Kor_1.12_1.13_1.14_9.1.a_9.1.d.docx), [INP-30(J)](https://www.apt.int/sites/default/files/2021/11/APG23-3-INP-30_J-3_WP3_PRELIMINARY_VIEWS_ON_WRC-23_AGENDA_ITEMS_1.12_1.13_1.14_9.1A_9.1D_AND_RES.655.docx)
* Information Documents: APG23-3/[INF-01(WMO)](https://www.apt.int/sites/default/files/2021/10/APG23-3-INF-01_Preliminary_WMO_Position_on_WRC-23_Agenda.docx), [INF-09(Chair, DG AI 1.12)](https://www.apt.int/sites/default/files/2021/10/APG23-3-INF-09_Briefing_on_AI1.12.docx), [INF-17(IARU)](https://www.apt.int/sites/default/files/2021/11/APG23-3-INF-17_IARU_Views.docx) , [INF-37(AMSG)](https://www.apt.int/sites/default/files/2021/11/APG23-3-INF-37_ASMG_Preparation_for_WRC-23.pdf) , [INF-39(ATU)](https://www.apt.int/sites/default/files/2021/11/APG23-3-INF-39_Report_of_APM23-2.docx)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Australia** - **Document APG23-3/**[**INP-09**](https://www.apt.int/sites/default/files/2021/10/APG23-3-INP-09_AUS_contribution_for_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1_Topics_a_and_d.docx)

Australia supports studies which assess the compatibility between spaceborne radar sounders and incumbent services around 45 MHz. If the study results are in support of a secondary allocation to EESS around 45 MHz, Australia supports enabling a secondary allocation, while ensuring protection of existing services and not imposing any additional restrictions onto these services.

**3.1.2 Indonesia (Republic of)** - **Document APG23-3/**[**INP-17**](https://www.apt.int/sites/default/files/2021/10/APG23-3-INP-17_Indonesia-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_and_9.1_Topics_a.docx)

Indonesia is of the view of the importance of studies by ITU-R relating to the preferred frequency band selection rationale, the typical technical and operating characteristics of the secondary allocation to the Earth exploration-satellite (active) service (EESS) for spaceborne radar sounders taking into account the protection of incumbent services including those in band and adjacent bands.

It is very important for all member countries to understand the urgency of additional new secondary allocation for Earth exploration-satellite (active) service, for safeguarding the limited frequency resources, aside from avoiding harmful interference to the existing and planned services in the primary as well as secondary basis.

**3.1.3 Republic of Korea** - **Document APG23-3/**[**INP-26**](https://www.apt.int/sites/default/files/2021/11/APG23-3-INP-26_WP3_Kor_1.12_1.13_1.14_9.1.a_9.1.d.docx)

The Republic of Korea is of the view that a possible new secondary allocation could be considered to the Earth exploration-satellite service (active) for spaceborne radar sounders within the range of frequencies around 45 MHz if ITU-R studies show that the protection of in-band and adjacent band incumbent services could be ensured while not imposing any additional restrictions on these services.

**3.1.4 Japan** - **Document APG23-3/**[**INP-30**](https://www.apt.int/sites/default/files/2021/11/APG23-3-INP-30_J-3_WP3_PRELIMINARY_VIEWS_ON_WRC-23_AGENDA_ITEMS_1.12_1.13_1.14_9.1A_9.1D_AND_RES.655.docx)

Japan is of the view that a possible new secondary allocation could be considered to the Earth exploration-satellite service (active) for spaceborne radar sounders within the range of frequencies around 45 MHz if ITU-R studies show that the protection of in-band and adjacent band incumbent services could be ensured while not imposing any additional restrictions onto those services.

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

The APT preliminary view below was developed further in the drafting group based on the preliminary views from APT members.

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

APT Members are of the view that a new secondary allocation could be supported for the Earth exploration-satellite service (active) for spaceborne radar sounders within the range of frequencies around 45 MHz if ITU-R studies show that the protection of in-band and adjacent band incumbent services could be ensured while not imposing any additional restrictions onto those services.

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

None.

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

APT Members are encouraged to monitor the progress of studies at ITU-R WP 7C and to contribute to future APG23 meetings so that the APT Preliminary Views on WRC-23 Agenda Item 1.12 can be further developed.

**7. Views from Other Organisations** (as provided in the information documents to

APG23-3)

**7.1 Regional Groups**

**7.1.1 ASMG** - **Document APG23-3/**[**INF-37**](https://www.apt.int/sites/default/files/2021/11/APG23-3-INF-37_ASMG_Preparation_for_WRC-23.pdf)

Support technical and regulatory studies under this agenda item for a possible new secondary allocation to the Earth Exploration Satellite Service (Active) for space-based radar sounding systems in the frequency range of about 45 MHz, while ensuring the protection of existing services in the 40-50 MHz band and in adjacent bands.

**7.1.2** **RCC - Document APG23-3/**[**INF-09**](https://www.apt.int/sites/default/files/2021/10/APG23-3-INF-09_Briefing_on_AI1.12.docx)

The RCC Administrations support conducting studies for a new secondary allocation to the Earth exploration-satellite (active) service within the range of frequencies around 45 MHz.

**7.1.3** **ATU - Document APG23-3/**[**INF-39**](https://www.apt.int/sites/default/files/2021/11/APG23-3-INF-39_Report_of_APM23-2.docx)

Support the ITU-R technical and regulatory studies to satisfy the invite under Resolution 656, while ensuring the protection of incumbent services in the frequency band 40-50 MHz and in the adjacent bandsnoting that**,** the scientific objectives of this application have significant global humanitarian benefits to the understanding of the environmental changes and climatic evolutions.

**7.2 International Organisations**

**7.2.1 IARU** - **Document APG23-3/**[**INF-17**](https://www.apt.int/sites/default/files/2021/11/APG23-3-INF-17_IARU_Views.docx)

The IARU acknowledges that the studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz include the need to protect the incumbent amateur service in the adjacent 50-54 MHz band. The IARU will contribute to the studies to ensure adequate protection of the sensitive receivers used by stations in the amateur service in the 50-54 MHz band, especially the frequencies 50-50.5 MHz where the majority of amateur communications via the ionosphere is conducted, often with very low signal levels.

**7.2.2 SFCG** - **Document APG23-3/**[**INF-09**](https://www.apt.int/sites/default/files/2021/10/APG23-3-INF-09_Briefing_on_AI1.12.docx)

SFCG supports a new secondary allocation to the EESS (active) in the 40-50 MHz band, subject to the completion of the studies in ITU-R that demonstrate compatibility between spaceborne radar sounders and incumbent services in the band.

**7.2.3 WMO** - **Document APG23-3/**[**INF-01**](https://www.apt.int/sites/default/files/2021/10/APG23-3-INF-01_Preliminary_WMO_Position_on_WRC-23_Agenda.docx)

WMO supports completion of studies to ensure compatibility of incumbent radio services with a view to creating secondary allocation to the EESS (active) at WRC-23.

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