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| **The 4th Meeting of the APT Conference Preparatory****Group for WRC-23 (APG23-4)** | **APG23-4/OUT-21** |
| 15 – 20 August 2022, Bangkok, Thailand | 20 August 2022 |

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** – A document containing draft CPM text for Agenda Item 1.12 is attached to the WP 7C Chair’s April/May 2022 meeting report (refer Annex 7 (Rev. 1) to ITU-R document [7C/361](https://www.itu.int/md/R19-WP7C-C-0361/en)). The latest preliminary draft CPM text currently contains two methods:

Method A proposes to establish a global secondary allocation over the frequency band 40-50 MHz including a footnote detailing the limited use of the EESS (active) secondary allocation and referencing a draft new resolution to protect incumbent services.

Method B also proposes to establish a global secondary allocation over the frequency band 40-50 MHz and inclusion of a footnote limiting the use of this band for spaceborne active radar systems, ensuring the protection of the radiolocation service in the 42-42.5 MHz and 46-68 MHz frequency bands.

1. **Revision of ITU-R Report RS.2455** – work continued at the April/May 2022 WP 7C meeting on the Preliminary draft revision of this report (refer Annex 5 to ITU-R document [7C/361](https://www.itu.int/md/R19-WP7C-C-0361/en)). The updates for this most recent version of the document were based on a number of input contribution documents as well as discussion in the WP 7C meeting. Document [7C/288](https://www.itu.int/md/R19-WP7C-C-0288/en) (from WP 6A) provided additional information recommending that WP 7C apply this with respect to the preliminary draft revised report. Document [7C/314](https://www.itu.int/md/R19-WP7C-C-0314/en) (USA) included replacement of the static RFI analysis for the amateur service in the adjacent band with a dynamic analysis (with attenuation factor for the spaceborne radar sounder lowered from 30dB to 20dB). Other changes included updates to the existing dynamic RFI analyses based on earlier feedback. Document [7C/330](https://www.itu.int/md/R19-WP7C-C-0330/en) (France) included updates to the Broadcasting Service sharing studies and conclusions related to these studies. Document [7C/336](https://www.itu.int/md/R19-WP7C-C-0336/en) (IEEE) included a second study scenario that considers an increase in the radar transmitted power from 20dBW to 29dBW aimed at maximizing the science return of the system.
2. **Revision of ITU-R Recommendation RS.2042** – no contributions were received at the April/May 2022 meeting of WP 7C regarding the proposed revision of ITU-R Recommendation RS.2042 and the existing preliminary draft revision was carried forward as an Annex to the WP 7C Chair’s report (refer Annex 6 to ITU-R document [7C/361](https://www.itu.int/md/R19-WP7C-C-0361/en)).

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/361 Annex 5](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0361%21N05%21MSW-E.docx) – preliminary draft revised Report ITU-R RS.2455-1 (from the WP 7C April/May 2022 meeting).
4. ITU-R Document [7C/361 Annex 6](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0361%21N06%21MSW-E.docx) – preliminary draft revised Recommendation ITU-R RS.2042-1 (from the WP 7C April/May 2022 meeting).
5. ITU-R Document [7C/361 Annex 7 (Rev1)](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0361%21N07-R1%21MSW-E.docx) – draft CPM text for WRC-23 agenda item 1.12 (from the WP 7C April/May 2022 meeting).

(*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(J)](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), [INP-16(AUS)](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), [INP-36(KOR)](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), [INP-42(CHN)](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), [INP-63(IND)](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), [INP-68(MLA)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-68_MLA_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_and_1.14.docx)
* Information Documents: APG23-4/ [INF-02(ATU)](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-02_ATU_preparation.docx), [INF-03(WMO)](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-03_WMO_Positions.docx), [INF-07(Chair, DG AI 1.12)](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-07_Brief_on_AI1.12.docx), [INF-21(ASMG)](https://www.apt.int/sites/default/files/2022/08/APG23-4-INF-21_ASMG_Preparation_for_WRC-23.pdf), [INF-27(IARU)](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), [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-48_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 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)

Japan supports 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.

**3.1.2 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 a secondary allocation to EESS (active) in the 40 ‑ 50 MHz frequency range if completed ITU-R studies show compatibility between spaceborne radar sounders and incumbent services. Protection should be ensured for existing services, including in adjacent bands, while not imposing any additional restrictions onto those services.

**3.1.3 Republic of Korea** - **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 could consider a new secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the band 40-50 MHz which are intended to be operated only in either uninhabited or sparsely populated areas of the globe, with particular focus on deserts and polar ice fields, if the protection of incumbent services already allocated in the same and adjacent band is ensured and these incumbent services are not adversely affected.

**3.1.4 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 new secondary allocation of the Earth exploration satellite service (active) of the Spaceborne Radar sounder in the frequency range of about 45 MHz in accordance with resolution 656 (WRC-19), if ITU-R studies show that the protection of in-band and adjacent band incumbent services could be ensured. Any change to the allocation of EESS (active) services within the 40-50 MHz frequency band should not restrict the operation of other primary and secondary incumbent services allocated within the frequency range.

**3.1.5 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 supports 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).

**3.1.6 Malaysia** - **Document APG23-4/**[**INP-68**](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-68_MLA_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_and_1.14.docx)

Malaysia supports the possible establishment of a global secondary allocation to the Earth exploration-satellite service (EESS) in the 40-50 MHz frequency band, while ensuring protection to incumbent services in the 40-50 MHz and adjacent frequency bands, subject to the completion of the relevant studies by ITU-R for this agenda item.

**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. The drafting group chair noted that the new APT preliminary view is similar to the previous version from APG23-3 however with a modification to identify the specific frequency range for possible allocation (40 – 50 MHz) as well as an addition highlighting the intent of radar sounder operations to be conducted in uninhabited and sparsely populated areas of the globe.

**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 in the 40 – 50 MHz frequency band if completed ITU-R studies show that the protection of in-band and adjacent band incumbent services would be ensured while not adversely affecting those services. It is noted that the spaceborne radar sounder is only intended to operate in either uninhabited or sparsely populated areas of the globe.

**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. WP 7C will finalise the draft CPM text for this agenda item at their next meeting in September/October 2022. APT Members are encouraged to review the draft CPM text and method(s) that could be supported for the next APG23-5 meeting where APT Members will finalise APT contributions to the CPM23-2 meeting as appropriate.

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

APG23-4)

**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 technical and regulatory studies under this agenda item, while ensuring the protection of existing services in the 40-50 MHz band and in adjacent bands.

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

**7.1.3** **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 a new secondary allocation to the Earth exploration‐satellite service (active) in the 40‐50 MHz band while ensuring the protection of incumbent services already allocated to the 40‐50 MHz band or adjacent frequency ranges.

**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)

Some Administrations support 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, in accordance with Resolution 656 (Rev.WRC-19), and taking into account the protection of incumbent services, including in adjacent bands.

**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) (Note: latest view below as at June 2022 provided by RCC during 15Aug WP3 meeting)

The RCC Telecommunication Administrations do not oppose secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the frequency band
40-50 MHz, while ensuring protection of incumbent services in this and adjacent frequency bands.

**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 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 APG23-4/**[**INF-07**](https://www.apt.int/sites/default/files/2022/07/APG23-4-INF-07_Brief_on_AI1.12.docx)

(Sept 21) 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.

(From the just concluded July 2022 SFCG meeting): SFCG supports a new secondary allocation to the EESS (active) in the 40-50 MHz band.

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