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| A close up of a sign  Description automatically generated | **World Radiocommunication Conference (WRC-23) Dubai, 20 November - 15 December 2023** | |  |
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| PLENARY MEETING | | **Addendum 12 to Document 99-E** | |
|  | | **27 October 2023** | |
|  | | **Original: English** | |
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| Japan | | | |
| PROPOSALS FOR THE WORK OF THE CONFERENCE | | | |
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| Agenda item 1.12 | | | |

1.12 to conduct, and complete in time for WRC‑23, studies for a possible new secondary allocation to the Earth exploration-satellite service (active) 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)**;

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.

Recommendation [ITU-R 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.

Work is currently ongoing in ITU-R Working Party 7C (WP 7C, the responsible group) to develop the new Report ITU-R RS.[Spaceborne VHF Radar Sounder] instead of revising the existing Report ITU-R RS.2455-0. This new Report contains the results of compatibility studies, based on the proposed Earth exploration-satellite service (EESS) (active) radar characteristics provided in Recommendation [ITU-R RS.2042-1](https://www.itu.int/rec/R-REC-RS.2042/en) and the characteristics of the incumbent services as provided by the responsible ITU-R Working Parties. Based on the draft CPM text developed at the ITU-R WP 7C, the CPM23-2 meeting agreed on the CPM Report for this agenda item containing the five methods to satisfy the agenda item.

– Method A1 proposes to establish a new global secondary allocation to the EESS (active) in the frequency band 40-50 MHz. It also proposes a new footnote in the Table of Frequency Allocations of RR Article **5** that references a proposed new WRC Resolution to protect incumbent in-band and adjacent-band services.

– Method A2 proposes to establish a new global secondary allocation to the EESS for active emissions. This new secondary allocation is proposed to be limited, through a dedicated footnote, to the operation of spaceborne radar sounder systems, over the frequency band 40-50 MHz, in the Table of Frequency Allocations of RR Article **5**. This footnote would also include relevant technical conditions, such as the power flux-density at the surface of the Earth, to address the protection of incumbent services in the frequency band 40-50 MHz.

– Method B proposes to establish a new global secondary allocation to the EESS for active emissions. This new secondary allocation is proposed to be limited, through a dedicated footnote, to the operation of spaceborne radar sounder systems, over the frequency band 40-50 MHz, in the Table of Frequency Allocations of RR Article **5**. This footnote would address the protection of the radiolocation service in the frequency bands 42-42.5 MHz and 46-68 MHz.

– Method C proposes to establish a global secondary allocation to the EESS for active emissions only.

– Method D proposes NOC.

Proposals

The mobile and radiodetermination services in the frequency band 40-50 MHz and the amateur service in the frequency band 50-54 MHz are allocated on a primary basis in Japan. Possible secondary allocation to the EESS (active) in the frequency band 40-50 MHz shall ensure that these incumbent services are adequately protected and not imposed additional restrictions.

In addition, wind profiler radars, which provide valuable scientific data, are being operated in the Asia-Pacific region, including Japan, and Antarctica. And it is preferred to continue operation of such radars.

In order to ensure the protection of the existing services in the frequency band 40-50 MHz and adjacent frequency bands, Japan supports the following elements:

– A new global secondary allocation to EESS (active) should be limited to spaceborne radar sounder systems.

– The establishment of operation limits for EESS (active) should include the pfd limit at the surface of the Earth, specific coverage areas as well as operation time limit.

– Active spaceborne sensors in the Earth exploration-satellite service should not cause harmful interference to, nor claim protection from stations in the radiolocation and space research services operating in the frequency band 40-50 MHz.

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations  
(See No. 2.1)

MOD J/99A12/1#1801

27.5-40.98 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 39.986-40  FIXED  MOBILE  Space research |  | 39.986-40  FIXED  MOBILE  RADIOLOCATION 5.132A  Space research |
| 40-40.02  FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  Space research | | 40-40.02  FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  Space research |
| 40.02-40.98 FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  5.150 | | |

**Reasons:** Method A1 in the CPM Report proposes to establish a new global secondary allocation to the EESS (active) in the frequency band 40-50 MHz.

ADD J/99A12/2#1804

5.A112-A1 The use of the frequency band 40-50 MHz by the Earth exploration-satellite service (active) shall be in accordance with Resolution **[A112‑METHOD‑A1] (WRC‑23)**.

The provisions of this footnote in no way diminish the obligation of the Earth exploration-satellite service (active) to operate as a secondary service in accordance with Nos. **5.29** and **5.30**.     (WRC‑23)

**Reasons:** Method A1 in the CPM Report proposes a new footnote in the Table of Frequency Allocations of RR Article **5** that references a proposed new WRC Resolution to protect incumbent in-band and adjacent-band services.

MOD J/99A12/3#1802

40.98-47 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 40.98-41.015 FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  Space research  5.160 5.161 | | |
| 41.015-42 FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  5.160 5.161 5.161A | | |
| 42-42.5  FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  Radiolocation 5.132A | 42-42.5  FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112 |  |
| 5.160 5.161B | 5.161 |  |
| 42.5-44 FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  5.160 5.161 5.161A | | |
| 44-47 FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112  5.162 5.162A | | |

**Reasons:** Method A1 in the CPM Report proposes to establish a new global secondary allocation to the EESS (active) in the frequency band 40-50 MHz.

MOD J/99A12/4#1803

47-75.2 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 47-50  BROADCASTING  Earth exploration-satellite (active) ADD 5.A112  5.162A 5.163 5.164 5.165 | 47-50  FIXED  MOBILE  Earth exploration-satellite (active) ADD 5.A112 | 47-50  FIXED  MOBILE  BROADCASTING  Earth exploration-satellite (active) ADD 5.A112  5.162A |

**Reasons:** Method A1 in the CPM Report proposes to establish a new global secondary allocation to the EESS (active) in the frequency band 40-50 MHz.

ADD J/99A12/5#1805

Draft New Resolution [A112-METHOD-A1] (WRC‑23)

Use of the frequency range 40-50 MHz allocated to the Earth exploration-satellite service (active) for spaceborne radar sounders

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that spaceborne active sensors operating in the Earth exploration-satellite service (EESS) (active), described in Recommendation ITU‑R RS.2042‑1, can provide unique information on the physical properties of the Earth, such as characteristics of polar ice sheets and subterranean fossil aquifers in desertic environments;

*b)* that spaceborne active remote sensing requires specific frequency ranges depending on the physical phenomena to be observed;

*c)* that worldwide, periodic measurements of subsurface water/ice deposits require the use of spaceborne radar sounder active sensors;

*d)* that the measurement of reflectivity from subsurface scattering layers as deep as 10 m to 100 m for shallow aquifers and groundwater conduits, and on the order of 5 km for basal interface topography and ice-sheet thickness, is necessary;

*e)* that spaceborne radar sounders operating in the EESS (active) are intended to be operated from polar orbits, only in either uninhabited, sparsely populated or remote areas of the globe, with particular focus on deserts and polar ice fields;

*f)* that the 40-50 MHz frequency range is preferable to satisfy all operational requirements for such spaceborne radar sounder active sensors,

recognizing

*a)* that, given the complexity of the EESS (active) instruments implementation in these low frequencies, very few such platforms are expected to be in orbit at the same time; consequently, aggregate interference from multiple spaceborne radar sounders into incumbent services is not anticipated and could be mitigated by coordination between the operators of such instruments;

*b)* that measurements by these radar sounders are only possible when the total electron content of the ionosphere is near its daily minimum, which normally occurs in a few hours’ window centred approximately at 4 a.m. local time;

*c)* that coordination between operators of EESS (active) systems and operators of wind profiler radars in the 40-50 MHz band may be needed on a case-by-case basis to ensure coexistence between the corresponding stations,

resolves

1 that the use of the band 40-50 MHz by EESS (active) is limited to spaceborne radar sounders as described in Recommendation ITU‑R RS.2042;

2 that the following conditions shall apply to stations operating in the EESS (active) in the frequency band 40-50 MHz on a secondary basis:

2.1 not claim protection from stations operating in the radiolocation service in the frequency bands 42-42.5 MHz or 46-50 MHz. No. **5.43A** does not apply;

2.2 not claim protection from stations operating in the space research service in the frequency bands 40-40.02 MHz or 40.98-41.015 MHz. No. **5.43A** does not apply;

2.3 operations are permitted when the subsatellite[[1]](#footnote-1)1 point is located within any of the following areas:

*a)* the spherical cap formed by latitudes between 72 and 90 degrees North;

*b)* the spherical cap formed by latitudes between 60 and 90 degrees South;

*c)* the quadrangle formed by latitudes between 59 and 72 degrees North and longitudes between 25 and 55 degrees West;

3 that stations in the EESS (active) operating in areas outside of those provided in *resolves*2.3 shall not transmit without prior agreement of directly overlapped and neighbouring administrations;

4 that the pfd level in the frequency band 40-50 MHz per single spaceborne radar sounder operated in the EESS (active) in the frequency band 40-50 MHz produced at the surface of the Earth shall not exceed −156 dB(W/(m2 · 4 kHz)) for more than 0.0002% of time, developed for clear-sky conditions. The limits above take into account the 3 dB aggregate loss due to polarization mismatch for the concerned services;

5 that the pfd level in the frequency band 50-54 MHz per single spaceborne radar sounder operated in the EESS (active) in the frequency band 40-50 MHz produced at the surface of the Earth shall not exceed −175 dB(W/(m2 · 4 kHz)) for more than 0.0002% of time, developed for clear-sky conditions. The limits above take into account the 3 dB aggregate loss due to polarization mismatch for the concerned services;

6 that the spaceborne radar sounder systems in the frequency range 40-50 MHz shall only operate from 3 a.m. to 6 a.m. of local time.

**Reasons:** In order to ensure the protection of the existing services in the frequency band 40‑50 MHz and adjacent bands, the contents listed in *resolves* are required.

SUP J/99A12/6#1814

RESOLUTION 656 (REV.WRC-19)

Possible secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz

**Reasons:** This Resolution is no longer necessary.

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1. 1 The subsatellite point is defined as the location of the projection of the satellite’s nadir-pointing vector onto the Earth’s surface. [↑](#footnote-ref-1)