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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 111-E** | |
|  | | **29 October 2023** | |
|  | | **Original: Chinese** | |
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| China (People's Republic of) | | | |
| 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)**;

Introduction

WRC-23 agenda item 1.12 seeks to study the possibility of a new secondary allocation to the Earth exploration-satellite service (EESS) (active) for spaceborne radar sounders within the range of frequencies around 45 MHz.

Five methods have been proposed in the CPM Report. 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 A1 includes four different options under its *resolves* part, noting that these different options are not necessarily mutually exclusive. 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 to address the protection of incumbent services in the frequency band 40-50 MHz. Method A2 includes two options. Method B also 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 dedicated footnote would address the protection of the secondary radiolocation service in the frequency bands 42-42.5 MHz and 46-68 MHz. Method C proposes to establish a new global secondary allocation to the EESS for active emissions without any limitation. Method D proposes no change to the Radio Regulations. The methods propose to suppress Resolution **656** (**WRC‑19**).

ITU-R WP 7C conducted a study on the spectrum requirement for a new global secondary allocation to the EESS (active) over the frequency band 40-50 MHz, and on the compatibility with some other systems of radio services. As a result of the study, WP 7C proposed a revision to an ITU-R Recommendation, the deletion of an existing ITU-R Recommendation, and a draft new Recommendation submitted to SG 7 for review, with the expectation that a new global secondary allocation over the above frequency band would be achieved during WRC-23.

Proposals

Based on the current study outcomes, under certain conditions, China is considering to support Method A1 with one or more options among Options 1, 3 and 4, as well as additional proposals that could ensure the sufficient protection for incumbent services over this frequency band and those in adjacent bands. China opposes Approach C due to the lack of sufficient protection for incumbent services in the same and adjacent frequency bands.

China proposes the following modifications to the Radio Regulations.

ARTICLE 5

Frequency allocations

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

MOD CHN/111A12/1#1810

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 | | |

ADD CHN/111A12/2#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**: By making a new global secondary allocation to the EESS (active) over the frequency band 40-50 MHz with a new footnote that references a proposed new resolution to protect incumbent in-band and adjacent-band services, to serve the needs of the detection of subsurface scattering layers for water, ice, and sediment using spaceborne radar sounders.

SUP CHN/111A12/3

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:** No longer required.

ADD CHN/111A12/4#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 No. **21.16.8** provides the equation to determine mean pfd values for EESS (active);

Note: *recognizing* *c)* does not apply to Option 2.

*d)* 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

Note: Various options are proposed below. Options 2, 3 and 4 are based on proposals submitted to CPM. Further consideration would be required to assess all four options for the protection of existing services.

*Views were expressed that* *Options 2 and 3 are based on proposals and studies that have not been reviewed and agreed by the ITU-R Study Groups and do not take into account the protection of existing services.*

*Some administrations expressed their view that none of the four options have reached an agreement in ITU-R. However, the proponents of option 3 stress the fact that the related provisions are based on relevant technical studies and have been designed in such a way to ensure protection of incumbent services.*

Option 1:

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, for the purpose of protecting the in-band and adjacent-band services, the pfd level per spaceborne radar sounder produced at the surface of the Earth shall not exceed [TBD]/[−156 dB(W/(m2 · 4 kHz))] for more than [TBD]/[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;

3 that the spaceborne radar sounder systems in the frequency range 40-50 MHz should only operate in a few hours’ window centred approximately at 4 a.m. local time.

**End of Option 1**

**Option 2:**

Option 3:

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, for the purpose of providing protection to the in-band and adjacent-band services, the mean pfd level per spaceborne radar sounder produced at the surface of the Earth shall not exceed the following limits, under free-space propagation conditions:

|  |  |
| --- | --- |
| pfd (dB(W/(m2 · 4 kHz))) | Latitude (degrees) |
| −145 | 0 < |Latitude| ≤ 64 |
| [between −145 and −138] | Latitude > 64 |
| −138 | Latitude <-64 |

3 that the limits provided in *resolves*2 may be exceeded for no more than 0.05% of the time, while not exceeding the following maximum pfd levels, under free-space propagation conditions:

|  |  |
| --- | --- |
| pfd (dB(W/(m2 · 4 kHz))) | Latitude (degrees) |
| −136 | 0 < |Latitude| ≤ 64 |
| [between −136 and −129 ] | Latitude > 64 |
| [−129] | Latitude<-64 |

4 that, if more than one system is in operation, administrations shall ensure collectively that the limits in *resolves*2 are not exceeded for more than 0.1% of the time and shall have consultations accordingly;

5 that the spaceborne radar sounder systems in the frequency range 40-50 MHz should only operate in a few hours’ window centred approximately at 4 a.m. local time,

invites the ITU Radiocommunication Sector

to regularly review the number and characteristics of spaceborne radar sounders and the application of *resolves*4 by concerned Member States.

**End of Option 3**

Option 4:

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, for the purpose of protecting the in-band and adjacent-band services, the pfd level per spaceborne radar sounder produced at the surface of the Earth shall not exceed [TBD]/[−156 dB(W/(m2 · 4 kHz))] for more than [TBD]/[0.0002%] of time, developed for clear-sky conditions, and the transmit peak power shall not exceed [TBD]/[20 dBW]. The limits above take into account the 3 dB aggregate loss due to polarization mismatch for the concerned services;

3 that the spaceborne radar sounder systems in the frequency range 40-50 MHz should only operate in a few hours’ window centred approximately at 4 a.m. local time.

**End of Option 4**

**Reasons:** Any modification to the allocation of EESS (active) services over the frequency band 40-50 MHz should not impede the operation of other primary or secondary services that have already been allocated. Under this condition, China supports a new global secondary allocation to EESS (active) services, to serve the needs for the detection of subsurface scattering layers for water, ice, and sediment using spaceborne radar sounders.

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