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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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|  | CPG(18)073 ANNEX V-07B |
| PLENARY MEETING | **Addendum 7B to**  **Document xxx-E** |
|  | **Date 2018** |
|  | **Original: English** |
|  | |
| European Common Proposals | |
| Proposals for the work of the conference | |
|  | |
| Agenda item 1.7 (Option B) | |

1.7 to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution **659 (WRC-15)**;

Introduction

Resolution 659 (WRC-15) *invites* ITU-R

– to study the spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions, taking into account No **1.23**;

– to assess the suitability of existing allocations to the space operation service in the frequency range below 1 GHz, taking into account *recognizing* a) and current use;

– if studies of the current allocations to the space operations service indicate that requirements cannot be met under *invites ITU-R* 1 and 2, to conduct sharing and compatibility studies, and study mitigation techniques to protect the incumbent services, both in-band as well as in adjacent bands, in order to consider possible new allocations or an upgrade of the existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz.

During the study period, ITU-R has developed a number of Reports.

One which contains technical characteristics for telemetry, tracking and command in the space operation service below 1 GHz for non-GSO satellites with short duration missions and another one which concludes that the spectrum requirements for short duration NGSO systems range from 0.625 MHz to 2.5 MHz in the space-to-Earth direction and from 0.682 MHz to 0.938 MHz in the Earth-to-space direction, depending on the operational scenario.

CEPT supports relevant bands for telemetry, tracking and command in the space operation service below 1 GHz for non-GSO satellites with short duration missions.

In order to respond to this need, This proposal consist in using the existing SOS allocation in the frequency band 137-138 MHz for downlink (space-to-earth) and to propose a new 1 MHz wide allocation in the frequency range 403-405 MHz band for uplink and to provide appropriate associated regulatory provisions in the Radio Regulations for telecommand links of non-GSO SD satellites.

In the frequency band 137-138 MHz, this proposal would apply to stations of the SOS (space-to-Earth) the same coordination threshold with terrestrial services as those for space stations of the MSS (space-to-Earth) (See sections 1.1.1 and 1.1.2 of Annex 1 of Appendix **5** of the RR).

For all other bands considered in ITU-R under this agenda item, CEPT supports the conclusions of the studies showing non-compatibility of non-GSO SD SOS systems with incumbent services and is hence proposing a “No Change”.

**Proposal**

ARTICLE 5

Frequency allocations

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

MOD EUR/XXXA7/1

75.2-137.175 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| … | | |
| 137-137.025 SPACE OPERATION (space-to-Earth) ADD 5.A17  METEOROLOGICAL-SATELLITE (space-to-Earth)  MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209  SPACE RESEARCH (space-to-Earth)  Fixed  Mobile except aeronautical mobile (R)  5.204 5.205 5.206 5.207 5.2085 | | |
| 137.025-137.175 SPACE OPERATION (space-to-Earth) ADD 5.A17  METEOROLOGICAL-SATELLITE (space-to-Earth)  SPACE RESEARCH (space-to-Earth)  Fixed  Mobile except aeronautical mobile (R)  Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.209  5.204 5.205 5.206 5.207 5.208 | | |

MOD EUR/XXXA7/2

137.175-138 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 137.175-137.825 SPACE OPERATION (space-to-Earth) ADD 5.A17  METEOROLOGICAL-SATELLITE (space-to-Earth)  MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209  SPACE RESEARCH (space-to-Earth)  Fixed  Mobile except aeronautical mobile (R)  5.204 5.205 5.206 5.207 5.208 | | |
| 137.825-138 SPACE OPERATION (space-to-Earth) ADD 5.A17  METEOROLOGICAL-SATELLITE (space-to-Earth)  SPACE RESEARCH (space-to-Earth)  Fixed  Mobile except aeronautical mobile (R)  Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.209  5.204 5.205 5.206 5.207 5.208 | | |

ADD EUR/XXXA7/35.A17 The frequency band 137-138 MHz is identified for use by administrations wishing to implement telemetry, tracking and command links for non-GSO satellites with short duration missions. Resolution **[A17-CEPT] (WRC‑19)** applies. This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. The use of the band 137-138 MHz is subject to application of the provision No. **9.14**. Provisions No **9.12**, **9.12A** and **9.13** do not apply.   (WRC‑19)

**Reasons :**

– to use the existing allocation to the SOS in this band efficiently;  
– to simplify the coordination with terrestrial services, **9.14** is introduced with the pfd threshold described in the Resolution;   
– **9.12**, **9.12A** and **9.13** do not apply because there is no technical reason requiring coordination.

[Note: further study regarding the appropriate application of the relevant regulatory provisions is needed]

NOC EUR/XXXA7/4

148-161.9375 MHz

**Reasons:** Studies have shown compatibility problems between non-GSO satellite with short duration missions operating under the space operation service and the incumbent services.

NOC EUR/XXXA7/5

161.9375-223 MHz

**Reasons:** Studies have shown compatibility problems between non-GSO satellite with short duration missions operating under the space operation service and the incumbent services.

NOC EUR/XXXA7/6

335.4-410 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 335.4-387 FIXED  MOBILE  5.254 | | |
| 387-390 FIXED  MOBILE  Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.254 5.255 | | |
| 390-399.9 FIXED  MOBILE  5.254 | | |
| 399.9-400.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.220 | | |
| 400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL- SATELLITE (400.1 MHz)  5.261 5.262 | | |
| 400.15-401 METEOROLOGICAL AIDS  METEOROLOGICAL-SATELLITE (space-to-Earth)  MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209  SPACE RESEARCH (space-to-Earth) 5.263  Space operation (space-to-Earth)  5.262 5.264 | | |
| 401-402 METEOROLOGICAL AIDS  SPACE OPERATION (space-to-Earth)  EARTH EXPLORATION-SATELLITE (Earth-to-space)  METEOROLOGICAL-SATELLITE (Earth-to-space)  Fixed  Mobile except aeronautical mobile | | |
| 402-403 METEOROLOGICAL AIDS  EARTH EXPLORATION-SATELLITE (Earth-to-space)  METEOROLOGICAL-SATELLITE (Earth-to-space)  Fixed  Mobile except aeronautical mobile | | |

**Reasons:**

* Studies have shown that there is no compatibility between short duration non-GSO systems operating in the Earth-to-space direction as well as the space-to-Earth direction and GSO Data Collection Systems the Meteorological-satellite service in the band 401-403 MHz.

Option B1

MOD EUR/XXXXA7OPB1/7

335.4-410 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| … | | |
| 403-404 METEOROLOGICAL AIDS  SPACE OPERATION (Earth-to-space) ADD 5.B17  Fixed  Mobile except aeronautical mobile  5.265 | | |
| 404-406 METEOROLOGICAL AIDS  Fixed  Mobile except aeronautical mobile  5.265 | | |
| … | | |

**Reasons:** [TBD]

[Notes:

– Some studies have shown that, co-channel sharing between radiosondes and rocketsondes on the one hand and short duration NGSO satellites operating under the space operation service in the Earth-to-space direction on the other hand, is feasible if a separation zone is respected. These studies show that separation distances can be decreased if mitigation techniques such as EIRP reduction and antenna pointing avoidance are used. One of these studies shows results based on the in-force Recommendation ITU-R RS.1263 where the worst case maximum separation distance amounts to 111 km when no mitigation techniques are applied. The results from this study based on the draft revision of Recommendation ITU-R RS.1263 show that the largest maximum separation distances are obtained for the case of Type C radiosondes (149 km when no mitigation techniques are applied). These results do not take into account clutter and terrain.

– Studies have shown that co-channel sharing with dropsondes is not feasible– Other studies related to radiosondes (separation distances of more than 300 km) and rocketsondes depict different results and hence definitive conclusions on the feasibility of sharing with other types of radiosondes have not been draw

– Study regarding impact assessment of separation distance to nomadic MetAids systems is needed

– Regulatory provisions for this option need to be developed including a methodology for assessing the coordination zone

– Adjacent band compatibility needs to be further studied]

ADD EUR/XXXXA7OPB1/8

5.B17 The use of the band 403-404 MHz by the space operation service (Earth-to-space) is limited to non-GSO satellites with short duration missions having a limited period of validity of not more than three years (refer to Resolution **4 (Rev WRC-03)**).   Resolution **[**A17-CEPT**] (WRC‑19)** applies.   (WRC‑19)

**Reasons:** The proposed allocation should be limited to non-GSO satellites with short duration missions.

Option B2

MOD EUR/XXXXA7OPB2/7

335.4-410 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| … | | |
| 403-404 METEOROLOGICAL AIDS  Fixed  Mobile except aeronautical mobile  5.265 | | |
| 404-405 METEOROLOGICAL AIDS  SPACE OPERATION (Earth-to-space) ADD 5.YYY  Fixed  Mobile except aeronautical mobile  5.265 | | |
| 405-406 METEOROLOGICAL AIDS  Fixed  Mobile except aeronautical mobile  5.265 | | |
| … | | |

**Reasons:** [TBD]

[Notes:

– Some studies have shown that, co-channel sharing between radiosondes and rocketsondes on the one hand and short duration NGSO satellites operating under the space operation service in the Earth-to-space direction on the other hand, is feasible if a separation zone is respected. These studies show that separation distances can be decreased if mitigation techniques such as EIRP reduction and antenna pointing avoidance are used. One of these studies shows results based on the in-force Recommendation ITU-R RS.1263 where the worst case maximum separation distance amounts to 111 km when no mitigation techniques are applied. The results from this study based on the draft revision of Recommendation ITU-R RS.1263 show that the largest maximum separation distances are obtained for the case of Type C radiosondes (149 km when no mitigation techniques are applied). These results do not take into account clutter and terrain.

– Studies have shown that co-channel sharing with dropsondes is not feasible.

– Other studies related to radiosondes (separation distances of more than 300 km) and rocketsondes depict different results and hence definitive conclusions on the feasibility of sharing with other types of radiosondes have not been drawn.

– Study regarding impact assessment of separation distance to nomadic MetAids systems is needed

– Regulatory provisions for this option need to be developed including a methodology for assessing the coordination zone

– Adjacent band compatibility needs to be further studied]

ADD EUR/XXXXA7OPB2/8

5.B17 The use of the band 404-405 MHz by the space operation service (Earth-to-space) is limited to non-GSO satellites with short duration missions having a limited period of validity of not more than three years (refer to Resolution **4 (Rev WRC-03)**). Resolution **[A17-CEPT] (WRC‑19)** applies.     (WRC‑19)

**Reasons:** The proposed allocation should be limited to non-GSO satellites with short duration missions.

NOC EUR/XXXA7/9

335.4-410 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 406-406.1 MOBILE-SATELLITE (Earth-to-space)  5.265 5.266 5.267 | | |
| 406.1-410 FIXED  MOBILE except aeronautical mobile  RADIO ASTRONOMY   * 1. .265 | | |

**Reasons:** Resolution **659 (WRC-15)** recognizes the special requirements for the protection of GMDSS and COSPAS-SARSAT (Resolution **205 (WRC-15)**). Therefore, any consideration of bands for use under this agenda item must exclude the 406-406.1 MHz COSPAS-SARSAT band as well as its adjacent 405.9-406 MHz and 406.1-406.2 MHz bands. Studies have shown that there is no compatibility between short duration non-GSO systems operating in the Earth-to-space direction as well as the space-to-Earth direction and the radio astronomy service in the band 406.1-410 MHz.

ADD EUR/XXX7/10

Draft New Resolution [A17-CEPT] (WRC-19)

Frequency bands identified for telemetry, tracking and command of non-GSO satellites with short duration missions

The World Radiocommunication Conference (Sharm El Sheikh, 2019)

considering

*a)* that the term “short duration mission” used in this Resolution refers to a mission having a limited period of validity of not more than three years;

*b)* that telemetry, tracking and command links for non-GSO satellites with short duration missions falls under the space operation service;

*c)* that these satellites are constrained in terms of low on-board power and low antenna gain;

*d)* that No. 5.XXX identifies the band 137-138 MHz (space-to-Earth) and No. **5.YYY** identifies the band [403-404] [404-405] MHz (Earth-to-space) for such applications;

*e)* that ITU-R studies have indicated that other frequency bands than those mentioned in *considering d)* allocated to the space operation service below 1 GHz are not suitable for such applications,

resolves

*a)* that administrations wishing to implement telemetry, tracking and command of non-GSO satellites with short duration missions use the bands 137-138 MHz and [403-404] [404-405] MHz;

*b)* that in the band 137-138 MHz (space-to-Earth) No’s 9.12, 9.12A, 9.13 and 9.14 does not apply to satellite networks or systems not exceeding a pfd value of -140 dB(W/(m². 4 kHz);

TBD

Note: relevant conditions pertaining to the band 403-405 MHz are to be defined (relevant coordination between satellite networks, mitigation techniques e.g. EIRP limitation, pointing avoidance)

further resolves

that the use of the bands in *considering d)* for non-GSO satellites in the space operation service with short duration missions does not establish priority in the Radio Regulations and does not preclude the use of the band for any application of the services to which they are allocated;

instructs the BR

in applying resolves b) at the notification stage, to check conformity with the pfd value contained herein during its examination under No. 11.31: if the value is met, the finding shall be favorable; if the value is exceeded, the Bureau shall check whether a coordination request has previously been sent for this satellite or otherwise issue an unfavorable finding under No. 11.32.

**Reasons :**

– to recognize the specificity of NGSO SD with an appropriate identification in the Radio Regulations;

– the definition of a pfd limit for coordination in 137-138 MHz will ensure more protection to terrestrial services than the current situation pertaining to the existing SOS allocation;

– Simplify the coordination procedure.

Note: further study regarding the appropriate application of the relevant regulatory provisions is needed

ADD EUR/XXXA7/11

TABLE 5-1 (continued)     (Rev.WRC‑15)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reference of Article 9 | Case | Frequency bands  (and Region) of the service  for which coordination  is sought | Threshold/condition | Calculation  method | Remarks |
| No. **9.13** GSO/ non‑GSO | A station in a GSO satellite network in the frequency bands for which a footnote refers to No. **9.11A** or No. **9.13**, in respect of any other non-GSO satellite network, with the exception of coordination between earth stations operating in the opposite direction of transmission | Frequency bands for which a footnote refers to No. **9.11A** or No. **9.13** | 1) Bandwidths overlap  2) For the band 1 668-1 668.4 MHz with respect to MSS network coordination with **SRS** (passive) networks, in addition to bandwidth overlap, the e.i.r.p. spectral density of mobile earth stations in a GSO network of the mobile-satellite service operating in this band exceeds −2.5 dB(W/4 kHz) or the power spectral density delivered to the mobile earth station antenna exceeds −10 dB(W/4 kHz) | 1) Check by using the assigned frequencies and bandwidths  2) Check by using MSS network Appendix **4** data |  |
| No. **9.14** Non-GSO/ terrestrial, GSO/ terrestrial | A space station in a satellite network in the frequency bands for which a footnote refers to No. **9.11A** or to No. **9.14**, in respect of stations of terrestrial services where threshold(s) is (are) exceeded | 1) Frequency bands for which a footnote refers to No. **9.11A**; or  2) 11.7-12.2 GHz (Region 2 GSO FSS)  3) 5 030-5 091 MHz  4) 137-138 MHz (SOS) | 1) See § 1 of Annex 1 to this Appendix; In the bands specified in No. **5.414A**, the detailed conditions for the application of No. **9.14** are provided in No. **5.414A** for MSS networks or  2) In the band 11.7-12.2 GHz (Region 2 GSO FSS): −124 dB(W/(m2 · MHz)) for 0° ≤ θ ≤ 5° −124 + 0.5 (θ – 5) dB(W/(m2 · MHz)) for 5° < θ ≤ 25° −114 dB(W/(m2 · MHz)) for θ > 25° where θ is the angle of arrival of the incident wave above the horizontal plane (degrees)  3) Bandwidth overlap  4) In the band 137-138 MHz (SOS) : -140 dB(W/(m².4kHz)) | 1) See § 1 of Annex 1 to this Appendix |  |

SUP EUR/XXXA7/12

RESOLUTION 659 (WRC‑15)

Studies to accommodate requirements in the space operation service for   
non-geostationary satellites with short duration missions

**Reasons:** Resolution is not needed anymore.

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