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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| PLENARY MEETING | **Addendum 7 to Document 14-E** |
|  | **9 October 2019** |
|  | **Original: English** |
|  | |
| Canada | |
| Proposals for the work of the conference | |
|  | |
| Agenda item 1.7 | |

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

This document contains a Canadian proposal for WRC‑19 agenda item 1.7, for the frequency ranges 137.025‑138 MHz, 148‑149.9 MHz and 404‑405 MHz.

Discussion on 137.025‑138 MHz and 148‑149.9 MHz

Canada proposes to use the existing space operation service allocation in the frequency ranges 137.025‑138 MHz and 148‑149.9 MHz to address the spectrum requirements identified for short duration missions.

Short duration missions are also being addressed under WRC‑19 agenda item 7, Issue I. Proposals developed under this issue would allow short duration missions to be identified through RR Appendix **4** characteristics and would impose restrictions to such systems in Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**, such as a limitation to the number of satellites and the maximum period of operation. In addition, proposals under agenda item 7 Issue I would also require a commitment from the notifying administration to undertake any steps to eliminate unacceptable interference.

In order to provide short duration missions with a faster notification process more suitable to their short development times, Canada proposes to remove the requirement to coordinate under RR No. **9.11A** in 137.025‑138 MHz and 148‑149.9 MHz, only for those systems identified as per Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**. In addition, requiring compliance with a new power flux-density limit in the band 137.025‑138 MHz would ensure that no coordination is required with other terrestrial services in the band. The requirement to obtain agreement under RR No. **9.21** is removed to make the band suitable for short duration missions, as recognized in Resolution **659 (WRC-15)**.

Some concerns were raised on the potential impact from short duration missions to adjacent aeronautical services below 137 MHz. Canada is of the view that the 25 kHz guardband in the range 137‑137.025 MHz, combined with a power flux-density limit would adequately protect adjacent services, consistent with some of the studies still being developed by ITU‑R Working Party 7B.

Discussion on 404‑405 MHz

Method B2 of the CPM Report considers a new space operation service allocation in the band 404‑405 MHz. The studies in Report ITU-R SA.2427 show that co-frequency sharing between meteorological aids services and short duration missions is not feasible, with exception of specific scenarios using local terrain.

However, in Canada, the use of the 404‑405 MHz band by meteorological aids systems is not widespread. Therefore, Canada is of the view that a new space operation service allocation in the frequency band 404‑405 MHz can be used in Canada without significant impact to the meteorological aids services. Additional measures implemented at the national level such as geographical separation and restricting the transmission of the space operation service outside the scheduled operation of meteorological aids stations could resolve the few occurrences where meteorological aids and short duration missions may use the same frequency channel.

ARTICLE 5

Frequency allocations

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

MOD CAN/14A7/1

75.2-137.175 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 137.025-137.175 SPACE OPERATION (space-to-Earth) ADD 5.A17 ADD 5.B17  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 MOD 5.208 | | |

**Reasons:** To add and modify footnotes associated to the use of short duration missions in the range 137.025-138 MHz.

MOD CAN/14A7/2

5.208 The use of the frequency band 137-138 MHz by the mobile-satellite service is subject to coordination under No. **9.11A**. The use of the frequency band 137.025-138 MHz by non-geostationary satellite systems in the space operation service identified as short duration missions in accordance with Resolution **[A7(I)-Ngso SHORT DURATION] (WRC-19)** is not subject to No. **9.11A**.    (WRC‑19)

**Reasons:** To remove the requirement to coordinate under RR No **9.11A** for short duration missions, providing short duration missions with a faster notification process for systems identified under and meeting the conditions defined in Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**.

The protection of other services and the ability to resolve potential interference issues with the mobile-satellite service would be ensured through RR No. **9.3**. In addition, short duration missions would be subject to the conditions defined in Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**, including a commitment not to cause unacceptable interference to other systems.

The first 25 kHz channel is not used to ensure protection of the aeronautical mobile (R) service in the adjacent band, in accordance with ongoing studies by ITU‑R Working Party 7B.

ADD CAN/14A7/3

5.A17 In the frequency band 137.025-138 MHz, the power flux-density produced by a space station of a non-geostationary satellite system in the space operation service identified as a short duration mission in accordance with Resolution [A7(I)-NGSO SHORT DURATION] (WRC-19)shall not exceed −140 dBW/(m2·4 kHz).    (WRC-19)

**Reasons:** Limiting the pfd to −140 dBW(m2·4 kHz) would ensure that the coordination with fixed and mobile services in the band, including the aeronautical mobile (OR) service, is not required. This limit would also ensure protection of the aeronautical mobile (R) service in the adjacent band, in accordance with ongoing studies at ITU‑R Working Party 7B.

ADD CAN/14A7/4

5.B17 The frequency bands 137.025-138 MHz and 148-149.9 MHz are identified for use by administrations wishing to implement non-geostationary satellites with short duration missions in the space operation service. This identification does not prevent the use of these frequency bands by any application of the services to which they are allocated, nor does it establish any priority in the Radio Regulations.    (WRC-19)

**Reasons:** Identification of the frequency bands 137.025-138 MHz and 148-149.9 MHz for non-geostationary satellites with short duration missions. The first 25 kHz channel is not used for short duration missions to ensure protection to aeronautical services in the adjacent band.

This footnote identifies the band for administrations wishing to identify systems in the space operation service as short duration mission, under the conditions defined in the Resolution being developed under agenda item 7, Issue I. Systems that do not identify as short duration missions may continue to use the frequency band for any of the allocated services, including the space operation service, under the current regulations.

MOD CAN/14A7/5#50219

137.175-148 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 137.175-137.825 SPACE OPERATION (space-to-Earth) ADD 5.A17 ADD 5.B17  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 MOD 5.208 | | |
| 137.825-138 SPACE OPERATION (space-to-Earth) ADD 5.A17 ADD 5.B17  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 MOD 5.208 | | |

**Reasons:** To add and modify footnotes associated the use of short duration missions in the range 137.025-138 MHz.

MOD CAN/14A7/6#50220

148-161.9375 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 148-149.9  FIXED  MOBILE except aeronautical mobile (R)  MOBILE-SATELLITE (Earth-to-space) 5.209  SPACE OPERATION (Earth-to-space) | 148-149.9  FIXED  MOBILE  MOBILE-SATELLITE (Earth-to-space) 5.209  SPACE OPERATION (Earth-to-space) MOD 5.218 | |
| MOD 5.218 MOD 5.219 5.221 | MOD 5.219 5.221 | |

**Reasons:** To modify footnotes associated to space operation service in the range 148-149.9 MHz.

MOD CAN/14A7/7#50221

5.218 The bandwidth of any individual transmission by stations of the space operation service in the band 148-149.9 MHz shall not exceed  25 kHz.

**Reasons:** The SOS (Earth-to-Space) allocation is moved from being a footnote to the Table of Frequency Allocations and identified as a primary allocation. The requirement to obtain agreement under RR No. **9.21** is removed to make the band suitable for short duration missions pursuant to Resolution **659 (WRC-15)**.

The protection of other services and the ability to resolve potential interference issues with the mobile-satellite service would be ensured through RR No. **9.3**. In addition, short duration missions would be subject to the conditions defined in Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**, including a commitment not to cause unacceptable interference to other systems. Coordination between SOS (Earth-to-space) and the fixed and mobile services would still be required under RR No. **9.17.**

MOD CAN/14A7/8

5.219 The use of the frequency band 148-149.9 MHz by the mobile-satellite service is subject to coordination under No. **9.11A**. The mobile-satellite service shall not constrain the development and use of the fixed, mobile and space operation services in the band 148-149.9 MHz. The use of the frequency band 148-149.9 MHz by non-geostationary satellite systems in the space operation service identified as short duration missions in accordance with Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)** is not subject to No. **9.11A**.

**Reasons:** To remove the requirement to coordinate under RR No **9.11A** for short duration missions, providing short duration missions with a faster notification process systems identified by and meeting the conditions defined in Resolution **[A7(I)-NGSO SHORT DURATION] (WRC‑19)**.

Short duration missions would be subject to the conditions defined in Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**, including a commitment not to cause unacceptable interference to other systems.

Coordination between SOS (Earth-to-space) and the fixed and mobile services would still be required under RR No. **9.17**.

MOD CAN/14A7/9

335.4-410 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 403-406 METEOROLOGICAL AIDS  Fixed  Mobile except aeronautical mobile  5.265 ADD 5.C17 | | |

**Reasons:** Add a country footnote for a space operation service allocation in the frequency band 404‑405 MHz to satisfy the uplink spectrum requirement for satellites with short duration missions.

ADD CAN/14A7/10

5.C17 *Additional allocation*:  in Canada, the frequency band 404-405 MHz is also allocated to the space operation service (Earth-to-space), limited to non-GSO satellite systems identified as short duration missions in accordance with Resolution **[A7(I)-NGSO SHORT DURATION] (WRC-19)**.

**Reasons:** To provide a new space operation service (Earth-to-space) allocation in Canada that would be limited to systems identified as short duration missions. The identification would be made at the system level as described in the Resolution developed under agenda item 7, issue I.

This allocation could be used by Canada, given limited operations in the meteorological aids service in the frequency band 404-405 MHz, at locations with sufficient distance from administrations that use this band more extensively by meteorological aids systems. Coexistence between meteorological aids and SOS with short duration missions could be facilitated at the national level by ensuring sufficient separation distance between SOS earth stations and known meteorological aids sites, and by restricting the transmission of SOS earth stations outside the scheduled operation of meteorological aids stations.

APPENDIX 7 (REV.WRC‑15)

Methods for the determination of the coordination area around an earth  
station in frequency bands between 100 MHz and 105 GHz

ANNEX 7

System parameters and predetermined coordination distances for determination of the coordination area around an earth station

# 3 Horizon antenna gain for a receiving earth station with respect to a transmitting earth station

MOD CAN/14A7/11

TABLE 7a     (Rev.WRC‑19)

Parameters required for the determination of coordination distance for a transmitting earth station

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Transmitting space radiocommunication  service designation | | Mobile-satellite, space operation | Earth  exploration-satellite, meteorological  satellite | | Space  operation | | Space  operation | Space research, space  operation | Mobile- satellite | Space operation | | Mobile- satellite, radio- determination- satellite | Mobile- satellite | | Space operation, space  research | | Mobile- satellite | | Space research, space  operation, Earth exploration-satellite | |
| Frequency bands (MHz) | | 148.0-149.9 | 401-403 | | 404-405 | | 433.75-434.25 | 449.75-450.25 | 806-840 | 1 427-1 429 | | 1 610-1 626.5 | 1 668.4-1 675 | | 1 750-1 850 | | 1 980-2 025 | | 2 025-2 110 2 110-2 120 (Deep space) | |
| Receiving terrestrial  service designations | | Fixed, mobile | Meteorological aids | | Meteorological aids | | Amateur, radiolocation fixed, mobile | Fixed, mobile, radio- location | Fixed, mobile broadcasting, aeronautical radionavigation | Fixed, mobile | | Aeronautical radionavigation | Fixed, mobile | | Fixed, mobile | | Fixed, mobile | | Fixed, mobile | |
| Method to be used | | § 2.1, § 2.2 | § 2.1, § 2.2 | |  | | § 2.1, § 2.2 | § 2.1, § 2.2 | § 1.4.6 | § 2.1, § 2.2 | | § 1.4.6 | § 1.4.6 | | § 2.1, § 2.2 | | § 1.4.6 | | § 2.1, § 2.2 | |
| Modulation at terrestrial station 1 | | A | A | N | A | N |  | A and N | A and N | A | N |  | A | N | A | N | A | N | A | |
| Terrestrial station interference parameters and criteria | *p*0 (%) | 1.0 |  |  | 3.0 | 3.0 |  | 0.01 | 0.01 | 0.01 | 0.01 |  | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |  | 0.01 | |
| *N* | 1 |  |  | 1 | 1 |  | 2 | 2 | 2 | 2 |  | 2 | 2 | 2 | 2 | 2 |  | 2 | |
| *p* (%) | 1.0 |  |  | 3.0 | 3.0 |  | 0.005 | 0.005 | 0.005 | 0.005 |  | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |  | 0.005 | |
| *NL* (dB) | – |  |  | 0 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |  | 0 | |
| *Ms* (dB) | – |  |  | 13 | 13 |  | 20 | 20 | 33 | 33 |  | 33 | 33 | 33 | 33 | 26 2 |  | 26 2 | |
| *W* (dB) | – |  |  | 0 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |  | 0 | |
| Terrestrial station parameters | *Gx* (dBi) 3 | 8 |  |  | 8 | 2.15 |  | 16 | 16 | 33 | 33 |  | 35 | 35 | 35 | 35 | 49 2 |  | 49 2 | |
| *Te* (K) | – |  |  | 226 | 289 |  | 750 | 750 | 750 | 750 |  | 750 | 750 | 750 | 750 | 500 2 |  | 500 2 | |
| Reference bandwidth | *B* (Hz) | 4 × 103 |  |  | 200 × 103 | 15 × 103 |  | 12.5 × 103 | 12.5 × 103 | 4 × 103 | 106 |  | 4 × 103 | 106 | 4 × 103 | 106 | 4 × 103 |  | 4 × 103 | |
| Permissible interference power | *Pr*(*p*) (dBW) in *B* | −153 |  |  | -139 | -149 |  | −139 | −139 | −131 | −107 |  | −131 | −107 | −131 | −107 | −140 |  | −140 | |
| 1 A: analogue modulation; N: digital modulation.  2 The parameters for the terrestrial station associated with transhorizon systems have been used. Line-of-sight radio-relay parameters associated with the frequency band 1 668.4-1 675 MHz may also be used to determine a supplementary contour.     (WRC‑03)  3 Feeder losses are not included. | | | | | | | | | | | | | | | | | | | |

**Reasons:** To provide a coordination distance for coordination between transmitting space operation earth stations and receiving meteorological aids stations. The permissible interference power was calculated using equation 127 in Annex 7 of RR Appendix 7, using characteristics provided in Recommendation ITU-R RS.1165 for radiosonde transmitters Type A and Type D.

SUP CAN/14A7/12#50216

RESOLUTION 659 (WRC‑15)

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

**Reasons:** Consequential suppression. Resolution 659 (WRC-15) is no longer necessary.

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