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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 3 toDocument 50-E** |
|  | **7 October 2019** |
|  | **Original: English** |
|  |
| Singapore (Republic of) |
| Proposals for the work of the conference |
|  |
| Agenda item 1.3 |

1.3 to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution **766 (WRC-15)**;

Introduction

Singapore supports the upgrading of the allocation for MetSat (space-to-Earth) from secondary to primary and the addition of a primary EESS (space-to-Earth) allocation in the band 460-470 MHz providing that: the fixed and mobile services are protected and the stations of the MetSat (space-to-Earth) and EESS (space-to-Earth) shall not cause interference to nor claim protection from stations of the fixed and mobile services.

Proposal

This proposal (in Attachment 1) is a variation on Method B to provide greater clarity on the treatment of frequency assignments of MetSat (space-to-Earth) and EESS (space-to-Earth) satellite networks for which complete notification information or coordination request was received by the Radiocommunication Bureau prior to the end of WRC-19.

Singapore notes from section 2.2 of Report ITU-R SA.2429 on the possibility of aggregation due to multiple satellites and is aware that concerns were raised by some administrations on the need to adjust the pfd limits provided in the CPM Report. Another concern is over the possible future number of additional satellite systems in the meteorological-satellite service and Earth exploration-satellite service in the band 460-470 MHz. Singapore can support measures to address these concerns, such as adjustment to the pfd limits.

ATTACHMENT 1

ARTICLE 5

Frequency allocations

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

MOD SNG/50A3/1#50192

460-890 MHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 460-470 EARTH EXPLORATION-SATELLITE (space-to-Earth)  FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE 5.286AA 5.287 5.288 ADD 5.A13 ADD 5.B13 ADD 5.C13 |

MOD SNG/50A3/2#50193

5.289 Earth exploration-satellite service applications, other than the meteorological-satellite service, may also be used in the band 1 690-1 710 MHz for space-to-Earth transmissions subject to not causing harmful interference to stations operating in accordance with the Table.     (WRC‑19)

SUP SNG/50A3/3#50194

5.290

ADD SNG/50A3/4#50196

5.A13 In the frequency band 460-470 MHz, earth stations in the meteorological-satellite service (space-to-Earth) and Earth exploration-satellite service (space-to-Earth) shall not claim protection from stations of the fixed and mobile services, and shall not claim protection from broadcasting service in the adjacent bands.     (WRC‑19)

ADD SNG/50A3/5#50197

5.B13 In the frequency band 460-470 MHz, space stations in the meteorological-satellite (space-to-Earth) and Earth exploration-satellite (space-to-Earth) shall comply with the following power flux-density limits.

For non-GSO space stations:

 

and for GSO space stations:

 

where α is the angle of arrival above the horizontal plane, in degrees.

These limits apply to all space stations in the meteorological-satellite service and Earth exploration-satellite service in this frequency band for which a complete notification information or coordination request was received by the Radiocommunication Bureau after the end of WRC‑19. Resolution **[SNG/A13] (WRC‑19)** shall apply.     (WRC‑19)

ADD SNG/50A3/6#50198

5.C13 In the frequency band 460-470 MHz stations in the Earth exploration-satellite service (space-to-Earth) shall not cause harmful interference to nor claim protection from stations in the meteorological-satellite service (space-to-Earth).     (WRC‑19)

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 SNG/50A3/7#50199

TABLE 8a     (Rev.WRC‑19)

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Receiving spaceradiocommunicationservice designation | Space operation, space research | Meteoro-logical- satellite, mobile-satellite | Space research | Space research, space operation | Space operation | Mobile-satellite | Meteoro-logical-satellite | Mobile-satellite | Space research | Space operation |  | Broad-casting- satellite | Mobile-satellite | Broadcasting- satellite(DAB) | Mobile-satellite,land-mobile satellite, maritime mobile-satellite |
| Frequency bands (MHz) | 137-138 | 137-138 | 143.6-143.65 | 174-184 | 163-167 272-273  5 | 335.4-399.9 | 400.15-401 | 400.15-401 | 400.15-401 | 401-402 |  | 620-790 | 856-890 | 1 452-1 492 | 1 518-1 5301 555-1 5592 160-2 200  1 |
| Transmitting terrestrial service designations | Fixed,mobile | Fixed,mobile | Fixed, mobile, radio-location | Fixed, mobile,broad-casting | Fixed, mobile | Fixed, mobile | Meteoro-logical aids | Meteoro-logical aids | Meteoro-logical aids | Meteoro-logical aids,fixed, mobile |  | Fixed, mobile,broad-casting | Fixed, mobile,broadcasting | Fixed, mobile,broadcasting | Fixed, mobile |
| Method to be used | § 2.1 | § 2.1 | § 2.1 | § 2.1 | § 2.1 | § 1.4.6 | § 1.4.6 | § 1.4.6 | – | § 2.1 |  | § 1.4.5 | § 1.4.6 | § 1.4.5 | § 1.4.6 |
| Modulation at earth station 2 | N |  | N |  | N |  |  |  | N | N |  |  |  | N | N |
| Earth stationinterferenceparametersand criteria | *p*0 (%) |  | 0.1 |  | 0.1 |  | 1.0 |  | 0.012 |  | 0.1 | 0.1 |  |  |  |  | 10 |
| *n* |  | 2 |  | 2 |  | 1 |  | 1 |  | 2 | 2 |  |  |  |  | 1 |
| *p* (%) |  | 0.05 |  | 0.05 |  | 1.0 |  | 0.012 |  | 0.05 | 0.05 |  |  |  |  | 10 |
| *NL* (dB) |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 | 0 |  |  |  |  | 0 |
| *Ms* (dB) |  | 1 |  | 1 |  | 1 |  | 4.3 |  | 1 | 1 |  |  |  |  | 1 |
| *W* (dB) |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 | 0 |  |  |  |  | 0 |
| Terrestrial station parameters | *E* (dBW)in *B*3 | A | – |  | – |  | 15 |  |  |  | – | – |  |  |  | 38 | 37  4 |
| N | – |  | – |  | 15 |  |  |  | – | – |  |  |  | 38 | 37 |
| *Pt* (dBW) in *B* | A | – |  | – |  | –1 |  |  |  | – | – |  |  |  | 3 | 0 |
| N | – |  | – |  | –1 |  |  |  | – | – |  |  |  | 3 | 0 |
| *Gx* (dBi) |  | – |  | – |  | 16 |  |  |  | – | – |  |  |  | 35 | 37 |
| Reference bandwidth | *B* (Hz) |  | 1 |  | 1 |  | 103 |  | 177.5 × 103 |  | 1 | 1 |  |  |  | 25 × 103 | 4 × 103 |
| Permissible interference power | *Pr*( *p*) (dBW)in *B* |  | −199 |  | −199 |  | −173 |  | −148 |  | −208 | −208 |  |  |  |  | −176 |
| 1 In the band 2 160-2 200 MHz, the terrestrial station parameters of line-of-sight radio-relay systems have been used. If an administration believes that, in this band transhorizon systems need to be considered, the parameters associated with the frequency band 2 500-2 690 MHz may be used to determine the coordination area.2 A: analogue modulation; N: digital modulation.3 *E* is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.4 This value is reduced from the nominal value of 50 dBW for the purposes of determination of coordination area, recognizing the low probability of high power emissions falling fully within the relatively narrow bandwidth of the earth station.5 The fixed-service parameters provided in the column for 163-167 MHz and 272-273 MHz are only applicable to the band 163-167 MHz. |

SUP SNG/50A3/8#50191

RESOLUTION 766 (WRC-15)

Consideration of possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary
status and a primary allocation to the Earth exploration-
satellite service (space-to-Earth) in the
frequency band 460-470 MHz

ADD SNG/50A3/9#50201

Draft New Resolution [SNG/A13] (WRC-19)

Transitional measures for existing satellite networks and systems of the meteorological-satellite service (space-to-Earth) and the
Earth exploration-satellite service (space-to-Earth) in the
frequency band 460-470 MHz

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that data collection systems (DCS) operate on geostationary and non-geostationary orbits in the meteorological-satellite service (MetSat) and the Earth exploration-satellite service (EESS) (Earth-to-space) in the frequency band 401-403 MHz;

*b)* that DCS are essential for monitoring and predicting climate change, monitoring oceans, and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security;

*c)* that most of these DCS have implemented satellite downlinks (space-to-Earth) in the frequency band 460-470 MHz which bring significant improvements to the operation of satellite DCS, such as the transmission of information to optimize the usage of the terrestrial data collection platforms;

*d)* that the frequency band 460-470 MHz is also used for the downlink of mission and telemetry data for meteorological and Earth-exploration purposes;

*e)* that the frequency band 460-470 MHz is allocated to the fixed and mobile services on a primary basis and is widely used by these services and is also identified for IMT on a global basis;

*f)* that World Radiocommunication Conference 2019 (WRC‑19) has upgraded the secondary allocation of the MetSat (space-to-Earth) to primary status and added a primary allocation to the EESS (space-to-Earth) in the frequency band 460-470 MHz, and established power flux-density (pfd) limits, providing protection and not imposing any additional constraints on existing primary services to which the frequency band is already allocated and in the adjacent frequency bands;

*g)* that the priority of MetSat systems over EESS systems in the frequency band 460‑470 MHz is provided to ensure protection of MetSat systems from interference from the increasing number of small satellite systems operating in the EESS;

*h)* that WRC‑19 suppressed No. **5.290** and the relevant parameters in Table **8a** of Appendix **7**, which identified some administrations that already have a primary allocation to the MetSat (space-to-Earth), subject to agreement obtained under No. **9.21,** in the light of the upgrade mentioned in *considering f)* above, and that it is necessary to provide some regulatory measures for satellite systems which operate in accordance with No. **5.290** to retain their regulatory status after the end of WRC‑19,

noting

*a)* that frequency assignments for several EESS and MetSat satellite networks and systems in the frequency band 460-470 MHz were notified and brought into use before 22 November 2019;

*b)* that some of these EESS and MetSat satellite networks and systems above may not meet the pfd limit in *considering f)*, but there is a need to continue to authorize them for operations in order to continue their operations,

resolves

1 that the satellite networks and systems in the meteorological-satellite (space-to-Earth) and Earth exploration-satellite (space-to-Earth) services in the frequency band 460-470 MHz for which a complete coordination request or advance publication information for geostationary satellite networks or notification information for non-geostationary satellite networks has been received by the Radiocommunication Bureau prior to the end of WRC‑19, and those space stations which meet the pfd limits given in footnote No. **5.B13**, may continue to operate with the same parameters under Appendix **4** submitted for coordination or notification;

2 that the frequency assignment of MetSat (space-to-Earth) and EESS (space-to-Earth) satellite network and systems in the frequency band 460-470 MHz for which complete notification information for non-geostationary satellite networks or coordination request or advance publication information for geostationary satellite networks was received by the Radiocommunication Bureau prior to the end of WRC‑19 and whose space stations do not meet the pfd limits given in footnote No. **5.B13** shall be used on a secondary basis with respect to the fixed and mobile service stations;

3 that the satellite systems in the meteorological-satellite service (space-to-Earth) referred to in *considering h)* for which complete coordination information related to No. **9.21** has been received by the Radiocommunication Bureau prior to the end of WRC‑19 shall operate on a primary basis, and that, for those systems, the relevant provisions of Articles **9** and **11** continue to apply, and the relevant agreements obtained under No. **9.21** remain in force after the end of WRC‑19;

4 that the MetSat and EESS in the 460-470 MHz band shall not limit the development or the deployment of the fixed, mobile and broadcast services allocated in the 460-470 MHz and adjacent bands;

5 that in the frequency band 460-470 MHz, earth stations in the meteorological-satellite service (space-to-Earth) and Earth exploration-satellite service (space-to-Earth) shall not claim protection from stations of the fixed and mobile services in the frequency band 460-470 MHz and shall not claim protection from stations of the broadcasting service operating in the adjacent band unless other agreements were obtained under No. **9.21** prior to the end of WRC‑19. No. **5.43A** does not apply;

6 that in the frequency band 460-470 MHz, stations in the Earth exploration-satellite service (space-to-Earth) shall not cause harmful interference to nor claim protection from stations in the meteorological-satellite service (space-to-Earth),

instructs the Director of the Radiocommunication Bureau

for the frequency assignment of MetSat (space-to-Earth) and EESS (space-to-Earth) satellite network for which complete notification information or coordination request was received by the Radiocommunication Bureau prior to the end of WRC‑19, the Bureau shall review the finding under No. **11.50** without requiring the administration to submit a new assignment. The date of such assignment’s original recording in the Master International Frequency Register (MIFR) shall remain unchanged. For satellite systems of MetSat (space-to-Earth) and EESS (space-to-Earth), which space stations do not meet the pfd limits given in footnote No. **5.B13**, the Bureau shall propose the notifying administration to provide commitment that harmful interference would not be caused to the fixed and mobile service stations. In case of receiving such a commitment, relevant frequency assignments may be published by the Bureau in relevant parts of the BR IFIC with note that the relevant administration has provided commitment not to cause harmful interference to the fixed and mobile service stations. If the notifying administration does not provide this commitment and requests to retain the assignment and states that it will be operated under No. **4.4**, the assignment shall be kept in MIFR for information purposes under the conditions of No. **8.5**. If no reply is received within 30 days after the date of the Bureau communication, the Bureau shall send a reminder. If no reply is received from the relevant administration within 30 days after the date of reminder, the Bureau shall suppress the concerned recorded assignment from the MIFR.

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