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| **Radiocommunication Study Groups** |  |
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| Source: Documents 7B/170 (Annex 3), 7B/198 and 7B/223 | **Annex 3 to Document 7B/238-E** |
| **6 November 2017** |
| **English only** |
| Annex 3 to Working Party 7B Chairman's Report | |
| Draft CPM Text on WRC-19 Agenda Item 1.3 | |
| 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)****;*

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

# 4/1.3/1 Executive summary

Taking into account the results of studies, this agenda item aims at determining the possibility of upgrading the secondary meteorological-satellite service (MetSat) (space-to-Earth) allocation to primary status and adding a primary Earth exploration satellite-service (EESS) (space-to-Earth) allocation in the frequency band 460-470 MHz. This has to be done while 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 as well as maintaining the conditions contained in RR No.[5.289](file:///C:\Users\TRISTANT\Documents\A-TRAVAIL\WRC-19\Agenda\5.289.docx). Also, the resultant pfd mask will be no less restrictive than -152 dBW/m2/4kHz.

A preliminary draft new Report ITU-R SA.[460 MHZ METSAT-EESS] is in development which compiles elements related to background on WRC-19 agenda item 1.3 as well as initial technical considerations on EESS and MetSat in the 460-470 MHz band and other services allocated in this band and adjacent bands, namely the mobile, maritime mobile, mobile satellite, fixed, and broadcasting services.

# 4/1.3/2 Background

The use of this 460-470 MHz band is already established due to the existence of a secondary allocation to MetSat. Meteorological satellites already transmit in this band to control and configure data collection platforms. 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) systems in the frequency band 401-403 MHz (uplink) and 460-470 MHz (downlink). DCS systems are essential for monitoring and predicting climate change, monitoring ocean, and water resources, weather forecasting and assisting in protecting biodiversity, as well as improving maritime security.

Data collection systems have been operating globally under a secondary allocation and on a primary basis in some countries under No 5.290, but this use is constrained by coordination under Article 9.21. This has led to differing limitations and protection criteria and has posed a barrier to implementation of essential DCS components on a global basis.

According to No. 5.289, Earth exploration-satellite service applications, other than the meteorological-satellite service, may also be used in the bands 460‑470 MHz and 1 690-1 710 MHz for space-to-Earth transmissions subject to not causing harmful interference to stations operating in accordance with the Table of Allocations.

One of the EESS/MetSat usages comprises the data collection platforms gathering information activity related to the Earth, the environment and scientific application, weather and environment observation. The data, which are collected by ground platforms, are sent to the corresponding satellites that retransmit the retrieved information to dedicated earth stations. DCS are particularly useful for the collection of data from remote and inhospitable locations where it may provide the only possibility for data relay. Even so, the system has very many uses in areas with a highly developed infrastructure. The installations required for relay of the data tend to be inexpensive, unobtrusive and normally blend easily into the local environment.

Amongst others, this band is currently used by the Advanced Data Collection System (A-DCS) also called ARGOS which is a unique worldwide location and data collection system dedicated to studying oceans and atmospheric conditions, preserving and monitoring wildlife, volcanoes, fishing fleets, shipments of dangerous goods, humanitarian applications and managing water resources.

DCS help the scientific community to better monitor and understand our environment, but also helps industry to comply with environmental protection regulations implemented by various governments. This positioning capability also permits applications such as monitoring drifting ocean buoys and studying wildlife migration paths.

A primary allocation to the MetSat service and EESS (downlink) in the frequency band 460‑470 MHz would provide confidence to space and meteorological agencies deeply involved in Satellite Data Collection Programs and the public sectors funding the development and operation of such systems. These space programs have been representing a long term effort and investment for decades between the time when the program is officially decided, the development, the launch phase, the time when the various satellites are in operation, keeping in mind that usually many satellites are deployed in order to provide a continuous service. In addition, space and meteorological agencies are investing in the continuity of these programs providing subsequent satellites and payloads. An upgrade would also provide the necessary long-term continuity for these programs of public interest.

# 4/1.3/3 Summary and Analysis of the results of ITU-R studies

The studies related to agenda item 1.3 (WRC-19) are given in Preliminary Draft New Report ITU-R SA.[460 MHZ METSAT-EESS].

This report is based on the most restrictive results for the PFD levels required to protect mobile and fixed services systems from Metsat/EESS satellite downlinks.

There were three cases of static analysis that presented criteria more stringent than -152 dBW/m2/4kHz. Dynamic analysis was performed where the static analysis resulted in PFD criteria more restrictive (less than) -152 dBW/m2/MHz and time constraints for the RFI were known. This was the case for P-P, P-MP and RF CSA systems. In the worst case below 5° was based on MS NB base stations, from 5° to 15°on RF CSA stations with 10 dBi antennas, and above 15° was based on the minimum permissible limit in accordance with AI 1.3 (WRC-15 Res. 766). The simulations do not take into account aggregation with GSO satellite because GSO and NGSO systems do not operate within the same frequency band.

The proposed pfd limit for the downlink emission of NGSO satellites is provided in terms of angle of arrivals α as:

The proposed pfd limit for the downlink emission of GSO satellites is provided in terms of angle of arrivals α as:

[TBD]

The frequency band 460-470 MHz has been utilized by several satellite systems, some of which are not able to meet the above pfd limit masks. An appropriate arrangement is necessary to ensure that the existing satellite systems, including those with a brought into use before date [insert date], can continue their operation according to the provisions adopted at WRC-19.

# 4/1.3/4 Methods

## 4/1.3/4.1 Method A

To upgrade the MetSat (space-to-Earth) allocation from secondary to primary status and a primary EESS (space-to-Earth) allocation should be added in the frequency band 460-470 MHz provided that the priority of MetSat over EESS as currently expressed in the RR is retained and that the protection of primary services in the frequency band and in adjacent frequency bands is ensured In addition, the primary services in this frequency band are not constrained by an upgrade of the Metsat allocation to primary status and an addition of primary EESS allocation.

In order to protect terrestrial services, pfd limits are proposed for both NGSO and GSO Metsat/EESS satellites.

In addition, modification to 5.290 are proposed for some administrations to have the ability to operate with higher pfd limits, subject to No. 9.21.

OR

Footnote **5.290** is modified to include the possibility to use proposed pfd limits.

Advantages

An upgrade of the existing MetSat allocation and a new primary EESS allocation would allow operators of Data collection platforms to design and operate their systems with more confidence. Regulatory measures need to be developed to protect the mobile and fixed service through an adequate pfd (power flux density) limit.

Disadvantages

None

# 4/1.3/5 Regulatory and procedural considerations

## 4/1.3/5.1 Method A

ARTICLE 5

Frequency allocations

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

MOD

460-890 MHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 460-470 FIXED  EARTH EXPLORATION-SATELLITE (space-to-Earth)  METEOROLOGICAL-SATELLITE (space-to-Earth)  MOBILE 5.286AA  5.287 5.288 SUP MOD 5.290 ADD 5.A1.3 ADD 5.B1.3 ADD 5.C1.3 | | |

MOD

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.

MOD

5.290 In Afghanistan, Azerbaijan, Belarus, China, the Russian Federation, Japan, Kyrgyzstan, Tajikistan and Turkmenistan, the allocation of the band 460-470 MHz to the meteorological-satellite service (space-to-Earth) and Earth exploration-satellite service is on a primary basis (see No. **5.33**), subject to agreement obtained under No. 9.21 or provisions 5.B1.3. No. **5.A1.3** does not apply.     (WRC‑12)

ADD

5.A1.3 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. No. 5.43A does not apply (WRC-19)

ADD

5.B1.3 In the frequency band 460-470 MHz, stations in the meteorological-satellite (space-to-Earth) and earth exploration-satellite (space-to-Earth) services shall comply with the power flux density limits below for NGSO:

where ɑ is the angle of arrival above the horizontal plane, in degrees. (WRC-19)

# *[Note: pfd mask for GSO systems will need to be addressed at next WP7B meeting)]*

ADD

**5. C1.3** In the frequency band 460-470 MHz stations in the earth exploration-satellite service (space-to-Earth) shall not cause harmful interference to 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 USA/4127/5

TABLE 8a     (Rev.WRC‑12)

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Receiving space radiocommunication service 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 | Earth exploration-satellite, Meteoro-logical- satellite | 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 | 460-470 | 620-790 | 856-890 | 1 452-1 492 | 1 518-1 530 1 555-1 559 2 160-2 200 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 | Fixed, mobile, broad-casting | Fixed, mobile, broad casting | 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 | § 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 station interference parameters and criteria | *p*0 (%) |  | 0.1 | |  | 0.1 |  | 1.0 |  | 0.012 |  | 0.1 | 0.1 | 0.012 |  |  |  | 10 |
| *n* |  | 2 | |  | 2 |  | 1 |  | 1 |  | 2 | 2 | 1 |  |  |  | 1 |
| *p* (%) |  | 0.05 | |  | 0.05 |  | 1.0 |  | 0.012 |  | 0.05 | 0.05 | 0.012 |  |  |  | 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 |  |  |  | – | – | 5 |  |  | 38 | 37 4 |
| N | – | |  | – |  | 15 |  |  |  | – | – | 5 |  |  | 38 | 37 |
| *Pt* (dBW)  in *B* | A | – | |  | – |  | –1 |  |  |  | – | – | –11 |  |  | 3 | 0 |
| N | – | |  | – |  | –1 |  |  |  | – | – | –11 |  |  | 3 | 0 |
| *Gx* (dBi) |  | – | |  | – |  | 16 |  |  |  | – | – | 16 |  |  | 35 | 37 |
| Reference bandwidth | *B* (Hz) |  | 1 | |  | 1 |  | 103 |  | 177.5 × 103 |  | 1 | 1 | 85 |  |  | 25 × 103 | 4 × 103 |
| Permissible interference power | *Pr*( *p*) (dBW) in *B* |  | −199 | |  | −199 |  | −173 |  | −148 |  | −208 | −208 | −178 |  |  |  | −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

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