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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 9 to Document 10(Add.21)-E** |
|  | **9 October 2019** |
|  | **Original: English** |
|  | |
| United States of America | |
| Proposals for the work of the conference | |
|  | |
| Agenda item 9.1(9.1.9) | |

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

9.1 on the activities of the Radiocommunication Sector since WRC-15;

9.1 (9.1.9) Resolution **162 (WRC-15)** **-** Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)

Introduction

In preparation for WRC-19, Working Party 4A (WP 4A) of the ITU-R has carried out the studies on spectrum requirements and the possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (FSS) (Earth-to-space). In response to Resolution **162 (WRC-15)**, WP 4A developed two Reports; one on spectrum needs for development of the FSS and the second one on sharing and compatibility between FSS and existing services.

Under consideration is to make an allocation for the frequency band 51.4-52.4 GHz to the FSS (Earth‑to‑space), limited to FSS feeder links, for geostationary orbit, use while protecting currently allocated services in the same frequency band and in adjacent frequency bands, to include the 52.6-54.25 GHz passive band.

ITU-R Working Party 4A carried out sharing and compatibility studies on allowing new primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space), considering the protection of fixed and mobile services already allocated in this band. It should be noted that the 51.4-52.6 GHz band is identified for high-density fixed service applications (footnote No. **5.547** of the Radio Regulations (RR)) and that some administrations are considering high-density mobile applications in the 50.4-52.6 GHz band.

ARTICLE 5

Frequency allocations

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

MOD USA/10A21A9/1#50165

51.4-55.78 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 51.4-52.4 FIXED  FIXED-SATELLITE (Earth-to-space) ADD 5.A919 ADD 5.B919  MOBILE  5.547 5.556 MOD 5.338A | | |
| 52.4-52.6 FIXED 5.338A  MOBILE  5.547 5.556 | | |

**Reasons:** Allocation to the FSS (Earth-to-space).

MOD USA/10A21A9/2#50166

5.338A In the frequency bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 30‑31.3 GHz, 49.7‑50.2 GHz, 50.4-50.9 GHz, 51.4-52.4 GHz, 52.4-52.6 GHz, 81-86 GHz and 92‑94 GHz, Resolution **750 (Rev.WRC‑19)** applies.     (WRC‑19)

**Reasons:** Application of the limits for FSS ES unwanted emissions as contained in the proposed revision to Resolution **750 (Rev.WRC-15)**.

ADD USA/10A21A9/3

5.A919 The use of the frequency band 51.4-52.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for geostationary satellite networks and the fixed-satellite service earth stations shall have a minimum antenna diameter of 4.5 metres. Additionally, administrations should take into account potential constraints to FSS in these bands, as appropriate, because of the potential deployment of high-density applications in the fixed service (No. **5.547**) and the use of the mobile service in the 51.4-52.6 GHz band.     (WRC‑19)

**Reasons:** To provide a new allocation limited to feeder links for FSS GSO networks, consistent with Resolution **162 (WRC-15)**.

ADD USA/10A21A9/4

5.B919 An administration that has submitted a notice under No. **9.6** with frequency assignments in the FSS on a GSO space station shall seek the agreement of other administrations with regard to their notified frequency assignments on GSO EESS space stations in the frequency band 52.6-54.25 GHz within 2.5 degrees of the nominal orbital position of the GSO FSS space station. Both administrations should take reasonable steps to reach an agreement.     (WRC-19)

**Reasons:** Suggested text to implement Option 1 of the CPM Text.

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section II − Power limits for terrestrial stations

MOD USA/10A21A9/5#50168

TABLE **21-2**     (Rev.WRC‑19)

|  |  |  |
| --- | --- | --- |
| Frequency band | Service | Limit as specified in Nos. |
| … | … | … |
| 10.7-11.7 GHz 5 (Region 1) 12.5-12.75 GHz 5 (Nos. 5.494 and 5.496) 12.7-12.75 GHz 5 (Region 2) 12.75-13.25 GHz 13.75-14 GHz (Nos. 5.499 and 5.500) 14.0-14.25 GHz (No. 5.505) 14.25-14.3 GHz (Nos. 5.505 and 5.508) 14.3-14.4 GHz 5 (Regions 1 and 3) 14.4-14.5 GHz 14.5-14.8 GHz 51.4-52.4 GHz | Fixed-satellite | 21.2**,** 21.3and21.5 |
| … | … | … |

**Reasons:** Inclusion of the frequency band proposed for the new allocation to FSS (Earth-to-space) for applicability of the limits in RR Nos. **21.2**, **21.3** and **21.5**.

Section III − Power limits for earth stations

MOD USA/10A21A9/6

TABLE **21-3**     (Rev.WRC‑19)

|  |  |  |
| --- | --- | --- |
| Frequency band | | Services |
| 2 025-2 110 MHz  5 670-5 725 MHz  5 725-5 755 MHz 6 | (for the countries listed in No. 5.454 with respect to the countries listed in Nos. 5.453 and 5.455)  (for Region 1 with respect to the countries listed in Nos. 5.453 and 5.455) | Earth exploration-satellite  Fixed-satellite  Meteorological-satellite  Mobile-satellite  Space operation |
| 5 755-5 850 MHz 6 | (for Region 1 with respect to the countries listed in Nos. 5.453 and 5.455) | Space research |
| 5 850-7 075 MHz |  |  |
| 7 190-7 250 MHz |  |  |
| 7 900-8 400 MHz |  |  |
| 10.7-11.7 GHz 6 | (for Region 1) |  |
| 12.5-12.75 GHz 6 | (for Region 1 with respect to the countries listed in No. 5.494) |  |
| 12.7-12.75 GHz 6 | (for Region 2) |  |
| 12.75-13.25 GHz |  |  |
| 14.0-14.25 GHz | (with respect to the countries listed in No. 5.505) |  |
| 14.25-14.3 GHz | (with respect to the countries listed in Nos. 5.505 and 5.508) |  |
| 14.3-14.4 GHz 6 | (for Regions 1 and 3) |  |
| 14.4-14.8 GHz |  |  |
| 17.7-18.1 GHz |  | Fixed-satellite |
| 22.55-23.15 GHz |  | Earth exploration-satellite |
| 27.0-27.5 GHz 6 | (for Regions 2 and 3) | Mobile-satellite |
| 27.5-29.5 GHz |  | Space research |
| 31.0-31.3 GHz | (for the countries listed in No. 5.545) |  |
| 34.2-35.2 GHz | (for the countries listed in No. 5.550 with respect to the countries listed in No. 5.549) |  |
| 51.4-52.4 GHz |  | Fixed-satellite |

**Reasons:** Inclusion of the frequency band proposed for the new allocation to FSS (Earth-to-space) for applicability of the limits in RR No. **21.8**.

APPENDIX 4 (REV.WRC‑15)

Consolidated list and tables of characteristics for use in the  
application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations  
or radio astronomy stations[[1]](#footnote-1)2    (Rev.WRC‑12)

Footnotes to Tables A, B, C and D

MOD USA/10A21A9/7#50170

**TABLE C**

CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS   
FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR   
RADIO ASTRONOMY ANTENNA      (Rev.WRC‑19)

| **Items in Appendix** | ***C \_ CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY  ASSIGNMENTS FOR A SATELLITE ANTENNA BEAM OR  AN EARTH STATION OR RADIO ASTRONOMY ANTENNA*** | **Advance publication of a geostationary- satellite network** | **Advance publication of a non-geostationary-satellite network subject to coordination under Section II  of Article 9** | **Advance publication of a non-geostationary-satellite network not subject to coordination under Section II  of Article 9** | **Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 30 or 30A)** | **Notification or coordination of a non-geostationary-satellite network** | **Notification or coordination of an earth station (including notification under  Appendices 30A or 30B)** | **Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)** | **Notice for a satellite network  (feeder-link) under Appendix 30A  (Articles 4 and 5)** | **Notice for a satellite network in the fixed- satellite service under Appendix 30B  (Articles 6 and 8)** | **Items in Appendix** | **Radio astronomy** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ... | ... |  |  |  |  |  |  |  |  |  |  |  |
| C.10.d.7 | the antenna diameter, in metres  In cases other than Appendix **30A**, required for fixed-satellite service networks operating in the frequency bands 13.75-14 GHz, 14.5-14.75 GHz (in countries listed in Resolution **163 (WRC‑15)** not for feeder links for the broadcasting-satellite service), 14.5-14.8 GHz (in countries listed in Resolution **164 (WRC‑15)** not for feeder links for the broadcasting-satellite service), 24.65‑25.25 GHz (Region 1), 24.65-24.75 GHz (Region 3) and for feeder links in 51.4-52.4 GHz for the fixed satellite service, and for maritime mobile-satellite service networks operating in the frequency band 14‑14.5 GHz |  |  |  | **+** | **+** |  |  | **X** |  | C.10.d.7 |  |
| ... | ... |  |  |  |  |  |  |  |  |  |  |  |

**Reasons:** Limitations for antenna diameter for the frequency band 51.4-52.4 GHz is proposed in footnote RR No. **5.A919**.

MOD USA/10A21A9/8

RESOLUTION 750 (Rev.WRC‑19)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

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

considering

*a)* that primary allocations have been made to various space services such as the fixed-satellite service (Earth-to-space), the space operation service (Earth-to-space) and the inter‑satellite service and/or to terrestrial services such as the fixed service, the mobile service and the radiolocation service, hereinafter referred to as ''active services'', in frequency bands adjacent or nearby to frequency bands allocated to the Earth exploration-satellite service (EESS) (passive) subject to No. **5.340**;

*b)* that unwanted emissions from active services have the potential to cause unacceptable interference to EESS (passive) sensors;

*c)* that, for technical or operational reasons, the general limits in Appendix **3** may be insufficient in protecting the EESS (passive) in specific frequency bands;

*d)* that, in many cases, the frequencies used by EESS (passive) sensors are chosen to study natural phenomena producing radio emissions at frequencies fixed by the laws of nature, and therefore shifting frequency to avoid or mitigate interference problems is not possible;

*e)* that the frequency band 1 400-1 427 MHz is used for measuring soil moisture, and also for measuring sea-surface salinity and vegetation biomass;

*f)* that long-term protection of the EESS in the frequency bands 23.6-24 GHz, 31.3‑31.5 GHz, 50.2-50.4 GHz, 52.6-54.25 GHz and 86-92 GHz is vital to weather prediction and disaster management, and measurements at several frequencies must be made simultaneously in order to isolate and retrieve each individual contribution;

*g)* that, in many cases, the frequency bands adjacent or nearby to passive service frequency bands are used and will continue to be used for various active service applications;

*h)* that it is necessary to ensure equitable burden sharing for achieving compatibility between active and passive services operating in adjacent or nearby frequency bands,

noting

*a)* that the compatibility studies between relevant active and passive services operating in adjacent and nearby frequency bands are documented in Report ITU‑R SM.2092;

*b)* that the compatibility studies between IMT systems in the frequency bands 1 375‑1 400 MHz and 1 427-1 452 MHz and EESS (passive) systems in the frequency band 1 400‑1 427 MHz are documented in Report ITU‑R RS.2336;

*c)* that Report ITU‑R F.2239 provides the results of studies covering various scenarios between the fixed service, operating in the frequency band 81-86 GHz and/or 92-94 GHz, and the Earth exploration-satellite service (passive), operating in the frequency band 86-92 GHz;

*d)* that Recommendation ITU-R RS.2017 provides the interference criteria for satellite passive remote sensing;

*e)* that Report ITU-R S.2463 provides the results of studies between FSS in the frequency band 51.4-52.4 GHz and EESS (passive) operating in the frequency band 52.6-54.25 GHz,

noting further

that, for the purpose of this Resolution:

− point-to-point communication is defined as radiocommunication provided by a link, for example a radio-relay link, between two stations located at specified fixed points;

− point-to-multipoint communication is defined as radiocommunication provided by links between a single station located at a specified fixed point (also called “hub station”) and a number of stations located at specified fixed points (also called “customer stations”),

recognizing

*a)* that studies documented in Report ITU‑R SM.2092 do not consider point-to-multipoint communication links in the fixed service in the frequency bands 1 350-1 400 MHz and 1 427‑1 452 MHz;

*b)* that, in the frequency band 1 427-1 452 MHz, mitigation measures, such as channel arrangements, improved filters and/or guardbands, may be necessary in order to meet the limits of unwanted emission for IMT stations in the mobile service specified in Table 1‑1 of this Resolution;

*c)* that, in the frequency band 1 427-1 452 MHz, IMT mobile stations typically perform better than the equipment specifications as stated by relevant standards organizations, which may be taken into account in meeting the limits specified in Table 1‑1 (see also sections 4 and 5 of Report ITU‑R RS.2336),

resolves

1 that unwanted emissions of stations brought into use in the frequency bands and services listed in Table 1‑1 below shall not exceed the corresponding limits in that table, subject to the specified conditions;

2 to urge administrations to take all reasonable steps to ensure that unwanted emissions of active service stations in the frequency bands and services listed in Table 1‑2 below do not exceed the recommended maximum levels contained in that table, noting that EESS (passive) sensors provide worldwide measurements that benefit all countries, even if these sensors are not operated by their country;

3 that the Radiocommunication Bureau shall not make any examination or finding with respect to compliance with this Resolution under either Article **9** or **11**.

TABLE 1-1

|  |  |  |  |
| --- | --- | --- | --- |
| EESS (passive) band | Active service band | Active service | Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band1 |
| 1 400- 1 427 MHz | 1 427- 1 452 MHz | Mobile | −72 dBW in the 27 MHz of the EESS (passive) band for IMT base stations  −62 dBW in the 27 MHz of the EESS (passive) band for IMT mobile stations2, 3 |
| 23.6-24.0 GHz | 22.55-23.55 GHz | Inter-satellite | −36 dBW in any 200 MHz of the EESS (passive) band for non-geostationary (non-GSO) inter-satellite service (ISS) systems for which complete advance publication information is received by the Bureau before 1 January 2020, and −46 dBW in any 200 MHz of the EESS (passive) band for non-GSO ISS systems for which complete advance publication information is received by the Bureau on or after 1 January 2020 |
| 31.3-31.5 GHz | 31-31.3 GHz | Fixed (excluding HAPS) | For stations brought into use after 1 January 2012: −38 dBW in any 100 MHz of the EESS (passive) band. This limit does not apply to stations that have been authorized prior to 1 January 2012 |
| 50.2-50.4 GHz | 49.7-50.2 GHz | Fixed-satellite (E‑to‑s)4 | For stations brought into use after the date of entry into force of the Final Acts of WRC‑07:  −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi  −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi |
| 50.2-50.4 GHz | 50.4-50.9 GHz | Fixed-satellite (E‑to‑s)4 | For stations brought into use after the date of entry into force of the Final Acts of WRC‑07:  −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi  −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi |
| 52.6-54.25 GHz | 51.4-52.6 GHz | Fixed | For stations brought into use after the date of entry into force of the Final Acts of WRC‑07:  −33 dBW in any 100 MHz of the EESS (passive) band |
| 52.6-54.25 GHz | 51.4-52.4 GHz | Fixed-satellite (E‑to‑s) | For stations brought into use after the date of entry into force of the Final Acts of WRC‑19:  −37 dBW in any 100 MHz of the EESS (passive) band for earth stations with antenna elevation angles lower than 75°  −52 dBW in any 100 MHz of the EESS (passive) band for earth stations with antenna elevation angles equal or higher than 75° |
| 1 The unwanted emission power level is to be understood here as the level measured at the antenna port.  2 This limit does not apply to mobile stations in the IMT systems for which the notification information has been received by the Radiocommunication Bureau by 28 November 2015. For those systems, −60 dBW/27 MHz applies as the recommended value.  3 The unwanted emission power level is to be understood here as the level measured with the mobile station transmitting at an average output power of 15 dBm.  4 The limits apply under clear-sky conditions. During fading conditions, the limits may be exceeded by earth stations when using uplink power control. | | | |

TABLE 1-2

|  |  |  |  |
| --- | --- | --- | --- |
| EESS (passive) band | Active service band | Active service | Recommended maximum level of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band1 |
| 1 400-1 427 MHz | 1 350-1 400 MHz | Radiolocation2 | −29 dBW in the 27 MHz of the EESS (passive) band |
| Fixed | −45 dBW in the 27 MHz of the EESS (passive) band for point-to-point |
| Mobile | −60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except transportable radio-relay stations  −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations |
| 1 427-1 429 MHz | Space operation (E-to-s) | −36 dBW in the 27 MHz of the EESS (passive) band |
| 1 427-1 429 MHz | Mobile except aeronautical mobile | −60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations3  −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations |
| Fixed | −45 dBW in the 27 MHz of the EESS (passive) band for point-to-point |
| 1 429-1 452 MHz | Mobile | −60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations, transportable radio-relay stations and aeronautical telemetry stations  −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations  −28 dBW in the 27 MHz of the EESS (passive) band for aeronautical telemetry stations3 |
| Fixed | −45 dBW in the 27 MHz of the EESS (passive) band for point-to-point |
| 31.3-31.5 GHz | 30.0-31.0 GHz | Fixed-satellite (E‑to‑s)4 | −9 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 56 dBi  −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 56 dBi |
| 86-92 GHz5 | 81-86 GHz | Fixed | −41 − 14(*f* − 86) dBW/100 MHz for 86.05 ≤ *f* ≤ 87 GHz  −55 dBW/100 MHz for 87 ≤ *f*≤ 91.95 GHz  where *f* is the centre frequency of the 100 MHz reference bandwidth expressed in GHz |
| 92-94 GHz | Fixed | −41 − 14(92 − *f*) dBW/100 MHz for 91 ≤ *f* ≤ 91.95 GHz  −55 dBW/100 MHz for 86.05 ≤ *f* ≤ 91 GHz  where *f* is the centre frequency of the 100 MHz reference bandwidth expressed in GHz |

|  |
| --- |
| *Notes to Table 1-2*:  1 The unwanted emission power level is to be understood here as the level measured at the antenna port.  2 The mean power is to be understood here as the total power measured at the antenna port (or an equivalent thereof) in the frequency band 1 400-1 427 MHz, averaged over a period of the order of 5 s.  3 The frequency band 1 429-1 435 MHz is also allocated to the aeronautical mobile service in eight Region 1 administrations on a primary basis exclusively for the purposes of aeronautical telemetry within their national territory (No. **5.342**).  4 The recommended maximum levels apply under clear-sky conditions. During fading conditions, these levels may be exceeded by earth stations when using uplink power control.  5 Other maximum unwanted emission levels may be developed based on different scenarios provided in Report ITU‑R F.2239 for the frequency band 86-92 GHz. |

**Reasons:** Conditions to limit the unwanted emissions from the FSS Earth stations falling in the frequency band 52.6 54.25 GHz to protect the EESS (passive).

\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 2 The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the BR IFIC (Space Services).     (WRC‑12) [↑](#footnote-ref-1)