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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 12(Add.21)-E** |
|  | **2 October 2019** |
|  | **Original: Russian** |
|  | |
| Regional Commonwealth in the field of Communications Common Proposals | |
| 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

Pursuant to Resolution **162 (WRC-15)**, ITU-R conducted studies on additional spectrum needs for the development of the fixed-satellite service (FSS) as well as studies on sharing and compatibility with existing services to determine the suitability of a new primary allocation to FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS gateway links for geostationary orbit use, and possible associated regulatory actions. The CPM Report, Document CPM 19-2/226 and two new ITU-R Reports (S.2461-0 and S.2463-0), approved by ITU-R Study Group 4 (07/2019), elaborate on such issues.

Report ITU-R S.2461 provides an analysis of spectrum needs for the development of FSS and justification for a new allocation in the frequency band 51.4-52.4 GHz for GSO FSS (Earth-to-space). Report ITU-R S.2463 contains studies on the sharing and compatibility of FSS with incumbent services, including the fixed service (FS) and mobile service (MS), Earth exploration-satellite service (EESS) (passive), radio astronomy service (RAS), and studies on sharing with potential IMT-2020 applications.

The RCC Administrations are in favour of a new allocation on a primary basis in the frequency band 51.4-52.4 GHz for FSS (Earth-to-space), while protecting currently allocated services in the same frequency band and in adjacent frequency bands.

The use of the FSS allocation (Earth-to-space) in the frequency band 51.4-52.4 GHz is possible under the following conditions:

– the use of the frequency band 51.4-52.4 GHz (Earth-to-space) should be limited to geostationary satellite networks;

– FSS earth stations should have a minimum antenna diameter of 2.4 metres and be notified at known locations on land;

– FSS earth stations should limit unwanted emission levels in the EESS (passive) frequency band 52.6-54.25 GHz to −37 dBW/100 MHz for FSS earth stations with maximum elevation angles below 75°. For FSS earth stations with elevation angles higher than or equal to 75°, unwanted emission levels should not exceed −52 dBW/100 MHz.

These limits for unwanted emissions should be specified in the proposed revision of Resolution **750 (Rev.WRC-15)**.

The RCC Administrations consider that for the protection of future GSO EESS (passive) sensors, FSS earth stations operating with GSO FSS space stations located within 3.2 degrees separation of a limited number of orbital positions should not exceed unwanted emission limits of −84 dBW/100 MHz to −34.2 dBW/100 MHz, according to the size of the orbital separation between the GSO FSS and GSO EESS space stations, see the proposed revision of Resolution **750 (Rev.WRC-15)**.

The RCC Administrations are in favour of the procedure for ensuring such protection described in Option 2 of the CPM Report: to give priorityto alimitednumberoforbital positions in the GSO arc for the operation of GSO EESS (passive) sensors. The GSO FSS networks with space stations located at less than 3.2 degrees separation ofsuch positions should adjust the unwanted emission levels from earth stations toprotect the EESS (passive) sensors as soon as they are notified.

These limits for unwanted emissions should be specified in the proposed revision of Resolution **750 (Rev.WRC-15)**.

In line with *resolves* 2 of Resolution **162 (WRC-15)** involving *“the possible associated regulatory actions”*, the RCC Administrations support possible regulatory action, (see Example given in the CPM Report), including modifications to Article **5**, Article **21**, Appendix **4** (Annex 2), Appendix **7** (Annex 7), and Resolution **750 (Rev.WRC-15)** of the Radio Regulations (RR).

Proposal

The RCC Administrations propose the adoption of the regulatory provisions and technical conditions set forth in annex hereto and the suppression of Resolution **162** (**WRC-15**).

ARTICLE 5

Frequency allocations

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

MOD RCC/12A21A9/1

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  MOBILE  5.547 5.556 MOD 5.338A | | |
| 52.4-52.6 FIXED MOD 5.338A  MOBILE  5.547 5.556 | | |

**Reasons:** Proposed new allocation to FSS (Earth-space).

MOD RCC/12A21A9/2

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 of Resolution **750 (Rev.WRC-15)**.

ADD RCC/12A21A9/3#50167

5.A919 The use of the frequency band 51.4-52.4 GHz by the fixed-satellite service (Earth-to-space) is limited to geostationary satellite networks and the fixed-satellite service earth stations shall have a minimum antenna diameter of 2.4 metres and shall be notified at known locations on land.     (WRC‑19)

**Reasons:** To limit the new allocation to gateways operating in FSS GSO networks, and to monitor the total number of FSS earth stations notified in the frequency band 51.4-52.4 GHz and their deployment density in order to protect EESS (passive).

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section II – Power limits for terrestrial stations

MOD RCC/12A21A9/4#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 51.4-52.4 GHz 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 RCC/12A21A9/5#50169

TABLE **21-3**     (Rev.WRC‑19)

|  |  |  |
| --- | --- | --- |
| Frequency band | | Services |
| … | … | … |
| 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 51.4-52.4 GHz proposed for the new allocation to FSS (Earth-to-space) for applicability of the limitsinRR No. **21.8**.

APPENDIX 4 (REV.WRC‑19)

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‑19)

Footnotes to Tables A, B, C and D

MOD RCC/12A21A9/6#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 51.4-52.4 GHz and for maritime mobile-satellite service networks operating in the frequency band 14‑14.5 GHz |  |  |  | **+** | **+** |  |  | **X** |  | C.10.d.7 |  |
| ... | ... |  |  |  |  |  |  |  |  |  |  |  |

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

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 RCC/12A21A9/7#50171

TABLE 7c    (Rev.WRC‑19)

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Transmitting space radiocommunication service designation | | Fixed- satellite | Fixed- satellite 2 | Fixed- satellite 3 | Space research | Earth  exploration-satellite, space research | Fixed-satellite, mobile-satellite, radionavigation-satellite | Fixed-satellite | Fixed- satellite 2 | |
| Frequency bands (GHz) | | 24.65-25.25 27.0-29.5 | 28.6-29.1 | 29.1-29.5 | 34.2-34.7 | 40.0-40.5 | 42.5-47 47.2-50.2 50.4-51.4 | 51.4-52.4 | 47.2-50.2 | |
| Receiving terrestrial  service designations | | Fixed, mobile | Fixed, mobile | Fixed, mobile | Fixed, mobile, radiolocation | Fixed, mobile | Fixed, mobile, radionavigation | Fixed, mobile | Fixed, mobile | |
| Method to be used | | § 2.1 | § 2.2 | § 2.2 |  | § 2.1, § 2.2 | § 2.1, § 2.2 | § 2.1 | § 2.2 | |
| Modulation at terrestrial station 1 | | N | N | N |  | N | N | N | N | |
| Terrestrial station interference parameters and criteria | *p*0 (%) | 0.005 | 0.005 | 0.005 |  | 0.005 | 0.005 | 0.005 | 0.001 | |
| *n* | 1 | 2 | 1 |  | 1 | 1 | 1 | 1 | |
| *p* (%) | 0.005 | 0.0025 | 0.005 |  | 0.005 | 0.005 | 0.005 | 0.001 | |
| *NL* (dB) | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | |
| *Ms* (dB) | 25 | 25 | 25 |  | 25 | 25 | 25 | 25 | |
| *W* (dB) | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | |
| Terrestrial station parameters | *Gx* (dBi) 4 | 50 | 50 | 50 |  | 42 | 42 | 42 | 46 | |
| *Te* (K) | 2 000 | 2 000 | 2 000 |  | 2 600 | 2 600 | 2 600 | 2 000 | |
| Reference bandwidth | *B* (Hz) | 106 | 106 | 106 |  | 106 | 106 | 106 | 106 | |
| Permissible interference power | *Pr*( *p*) (dBW) in *B* | −111 | −111 | −111 |  | −110 | −110 | −110 | −111 | |
| 1 A: analogue modulation; N: digital modulation.  2 Non-geostationary satellites in the fixed-satellite service.  3 Feeder links to non-geostationary-satellite systems in the mobile-satellite service.  4 Feeder losses are not included. | | | | | | | | | |

**Reasons:** Consequence of proposed new allocation to FSS in the frequency band 51.4-52.4 GHz.

MOD RCC/12A21A9/8#50172

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),

…

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 and in Report ITU‑R S.2463;

*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,

…

MOD RCC/12A21A9/9#50172

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;

…

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 |
| --- | --- | --- | --- |
| … | … | … | … |
| 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:  a power level of −37 dBW in any 100 MHz of the EESS (passive) band for earth stations with antenna elevation angles below 75°;  a power level of −52 dBW in any 100 MHz of the EESS (passive) band for earth stations with antenna elevation angles equal to or higher than 75°.  For earth stations operating with a GSO FSS space station whose orbital separation Δ is equal to or less than 3.2° from the GSO EESS (passive) space stations with nominal orbital positions from the time of notification: 0°, 3.5° E, 9.5° E, 41.5° E, 76° E, 79° E, 86.5° E, 99.5° E, 105° E, 112° E, 123.5° E, 133° E, 165.8° E, 3.2° W, 14.5° W, 75° W and 137° W:  −84 + 200 Δ (dBW/100 MHz) for 0°≤ Δ < 0.1°  −67 + 22.8 Δ (dBW/100 MHz) for 0.1°≤ Δ < 0.5°  −61 + 11.3 Δ (dBW/100 MHz) for 0.5° ≤ Δ < 1.9°  −47 + 4 Δ (dBW/100MHz） for 1.9° ≤ Δ ≤ 3.2° |
| 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. | | | |

**Reasons:**  
1 To limit unwanted emissions from the FSS earth stations falling in the frequency band 52.6‑54.25 GHz, for the protection of EESS (passive) according to the antenna elevation angle of the FSS earth stations concerned.  
2 To limit unwanted emissions from the FSS earth stations falling in the frequency band 52.6‑54.25 GHz, for the protection of GSO EESS (passive) space stations at orbital positions specified for GSO according to their orbital separation from GSO FSS space stations.

SUP RCC/12A21A9/10

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)

**Reasons:** It is proposed to delete this resolution, as studies under WRC-19 agenda item 9.1 (9.1.9) have been completed.

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

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)