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|  | ASIA-PACIFIC TELECOMMUNITY | **Document No:** |
| **The 2nd Meeting of the APT Conference Preparatory Group for WRC-23 (APG23-2)** | **APG23-2/INF-13** |
| 19 – 23 April 2021, Virtual/Online Meeting | 23 March 2021 |

Chairman, DG on Article No. 21.5

**BRIEF ON Studies on ARTICLE NO. 21.5 requested by WRC-19**

(Note: *This brief was developed for information purpose only. It does not necessarily express the view of APG-23*)

**Article No. 21.5:**

**Relevant Resolutions and Responsible/Contributing ITU-R Groups**

Administrative Circular [CA/251](https://www.itu.int/md/R00-CA-CIR-0251/en) on “Results of the first session of the Conference Preparatory Meeting for WRC-23 (CPM23-1)” explains as follows:

– From [WRC-19 Document 550](https://www.itu.int/md/R16-WRC19-C-0550/en) – “ITU‑R is invited to study, as a matter of urgency, the applicability of the limit specified in No. **21.5** of the Radio Regulations to IMT stations, that use an antenna that consists of an array of active elements, with a view to recommend ways for its possible replacement or revision for such stations, as well as any necessary updates to Table **21-2** related to terrestrial and space services sharing frequency bands. Furthermore, the ITU-R is invited to study, as a matter of urgency, verification of No. **21.5** regarding the notification of IMT stations that use an antenna that consists of an array of active elements, as appropriate.” (Responsible Group: WP 5D)

**1. Background Information**

**1.1 Background**

At CPM19-2, some issues on application of No. **21.5** of the ITU Radio Regulations (RR No. **21.5**) to terrestrial stations with active antenna systems were raised by an administration in Document [CPM19-2/72](https://www.itu.int/md/R15-CPM19.02-C-0072/en). This is because “the power delivered by a transmitter to the antenna of a station” mentioned in RR No. **21.5** may not be directly available using an advanced antenna that consist of an array of active elements.

Different views were expressed and included in the [CPM19-2 Report](https://www.itu.int/md/R15-CPM19.02-R-0001/en) as a preparatory work for WRC-19 AI 1.13.

At WRC-19, two contributions ([WRC-19 Documents 12!A13](https://www.itu.int/md/R16-WRC19-C-0012/en), [128](https://www.itu.int/md/R16-WRC19-C-0128/en)) in relation to RR No. **21.5** were submitted. This topic was extensively discussed and its outcome was included in WRC-19 [Document 550](https://www.itu.int/md/R16-WRC19-C-0550/en) on agenda item 1.13, and the text set out in the annex to the [Document 550](https://www.itu.int/md/R16-WRC19-C-0550/en) was approved and included in the minutes (WRC-19 Document [573](https://www.itu.int/md/R16-WRC19-C-0573/en)) of the meeting as a decision of the conference.

The topic of RR No. **21.5** was brought to the attention of CPM23-1 that requests study be performed in ITU-R. This does not specifically request action or reporting to WRC-23 so is not included in the topics under WRC-23 agenda item 9.1 in Annex 7 to [CA/251](https://www.itu.int/md/R15-CPM19.02-R-0001/en). However, ITU-R WP 5D, as the responsible group, is invited to carry out the requested study as a matter of urgency and to report the results of the study to the Director of the Radiocommunication Bureau to be considered as the Director deems appropriate.

**1.2 Relevant information**

The following provisions in the ITU Radio Regulations are referenced in the on-going ITU-R studies by WP 5D.

**1.2.1 RR No. 21.5, Table 21-2 and related provisions in Article 21**

**21.3** § 3 1) The maximum equivalent isotropically radiated power (e.i.r.p.) of a station in the fixed or mobile service shall not exceed +55 dBW.

**21.5** 3) The power delivered by a transmitter to the antenna of a station in the fixed or mobile services shall not exceed +13 dBW in frequency bands between 1 GHz and 10 GHz, or +10 dBW in frequency bands above 10 GHz, except as cited in No. **21.5A**.    (WRC‑2000)

**21.5A** As an exception to the power levels given in No. **21.5**, the sharing environment within which the Earth exploration-satellite (passive) and space research (passive) services shall operate in the band 18.6-18.8 GHz is defined by the following limitations on the operation of the fixed service: the power of each RF carrier frequency delivered to the input of each antenna of a station in the fixed service in the band 18.6-18.8 GHz shall not exceed −3 dBW.     (WRC‑2000)

**21.6** 4) The limits given in Nos. **21.2**, **21.3**, **21.4**, **21.5** and **21.5A** apply, where applicable, to the services and frequency bands indicated in Table **21-2** for reception by space stations where the frequency bands are shared with equal rights with the fixed or mobile services:     (WRC‑2000)

TABLE **21-2**     (Rev.WRC‑19)

|  |  |  |
| --- | --- | --- |
| **Frequency band** | **Service** | **Limit as specifiedin Nos.** |
| 1 427-1 429 MHz1 610-1 645.5 MHz (No. **5.359**)1 646.5-1 660 MHz (No. **5.359**)1 980-2 010 MHz2 010-2 025 MHz (Region 2)2 025-2 110 MHz2 200-2 290 MHz2 655-2 670 MHz (Regions 2 and 3)2 670-2 690 MHz (Regions 2 and 3)5 670-5 725 MHz (Nos. **5.453** and **5.455**)5 725-5 755 MHz (Region 1 countries listed in Nos. **5.453** and **5.455**)5 755-5 850 MHz (Region 1 countries listed in Nos. **5.453** and **5.455)**5 850-7 075 MHz7 145-7 235 MHz 7 900-8 400 MHz | Fixed-satelliteMeteorological-satelliteSpace researchSpace operationEarth exploration-satelliteMobile-satellite | **21.2**, **21.3**,**21.4** and **21.5** |
| 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 GHz13.75-14 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 GHz14.5-14.8 GHz51.4-52.4 GHz | Fixed-satellite | **21.2**, **21.3** and **21.5** |
| 17.7-18.4 GHz18.6-18.8 GHz19.3-19.7 GHz22.55-23.55 GHz24.45-24.75 GHz (Regions 1 and 3)24.75-25.25 GHz (Region 3)25.25-29.5 GHz | Fixed-satelliteEarth exploration-satelliteSpace researchInter-satellite | **21.2, 21.3, 21.5** and **21.5A** |

**1.2.2 Table 1 in Appendix 4**

TABLE 1     (Rev.WRC‑15)

**Characteristics for terrestrial services**

|  |  |  |
| --- | --- | --- |
| **Column No.** | **Item identifier** | **Notice related to****Description of data items and requirements** |
| **8.3** | **8AA** | the power delivered to the antenna, in dBWIn the case of a transmitting station, required for an assignment:– in the bands below 28 MHz, in all services except the radionavigation service; or – in the bands above 28 MHz shared with space services; or– in the bands above 28 MHz not shared with space services:• in the aeronautical mobile service, meteorological aids service; or• in all other services, if the radiated power is not suppliedIn the case of a receiving land station, required if the associated transmitting station’s radiated power is not suppliedIn the case of a typical transmitting station, required if the radiated power is not supplied |
| **8.6** | **8B** | the radiated power, in dBW, in one of the forms described in Nos. **1.161** to **1.163***Note* – Where adaptive systems in the fixed or mobile service operating in the bands between 300 kHz and 28 MHz (see also Resolution **729 (Rev.WRC‑07)**) use automatic power control, the radiated power includes the level of power control listedunder 8BAFor assignments in all services and frequency bands, except assignments subject to the GE06 Regional Agreement, required if the power delivered to the antenna (8AA), or the maximum antenna gain (9G), is not providedFor an assignment subject to the GE06 Regional Agreement, required if the power delivered to the antenna (8AA) is not provided |
| **9.3.4** | **9G** | the maximum antenna gain (isotropic, relative to a short vertical antenna or relative to a half-wave dipole, as appropriate) of the transmitting antenna (see No. 1.160)For a directional antenna, the gain is in the direction of maximum radiationIn the case of a transmitting station, or a typical transmitting station:– for all frequency bands and services, except assignments subject to the GE06 Regional Agreement, required if the antenna is:– directional, including where the antenna beam is rotating or swept; or– non-directional, and the power to the antenna (8AA) or the radiated power (8B) is not provided– for an assignment subject to the GE06 Regional Agreement required if the radiated power (8B) is not providedIn the case of a maritime mobile frequency allotment, required if the antenna is directional, including where the antenna beam is rotating or swept |

**2. Information on on-going ITU-R Study**

* Hyperlink to the relevant part of the webpage of [ITU-R Preparatory Studies for WRC-23](https://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/wrc-23-studies.aspx)

**2.1 Documents being developed**

As requested by CPM 23-1, WP 5D is working on the development of a Note to the Director of the Radiocommunication Bureau to be considered as the Director deems appropriate. A working document being discussed in Drafting Group Article 21.5 ([5D/Temp/309](https://www.itu.int/md/R19-WP5D-210301-TD-0309/en)) had been compiled based on the inputs to WP 5D meetings.

**2.2 Contentious issues**

During the 34th, 35th (e-meeting), 36th (e-meeting) and 37th (e-meeting) of WP 5D meetings in year 2020 and 2021, several input contributions had been received from members on this topic and extensive discussions had taken place on various aspects.

There are several contentious issues with respect to studies on RR No. **21.5**.

**2.2.1 Verification of RR No. 21.5 for notification of IMT stations that use an antenna that consists of an array of active elements (Which value should be filled in the data item 8AA of Table 1 in Appendix 4?)**

- One view is to fill in the value of Total Radiated Power (TRP) or the value of power calculated by an equation.

- Another view is to fill in the value of power delivered by a single transceiver to the antenna.

**2.2.2 Several frequency bands were identified in WRC-19 for IMT, some of which have equal right with space services. The issue of verification regarding notification of the stations operating in these frequency bands should be resolved**.

- One view is to solve the issue of 26 GHz first, then solve the issue in other bands;

- Another view is to solve the issue of the relevant frequency bands together.

**2.2.3 The applicability of the limit specified in RR No. 21.5 of the Radio Regulations to stations that use an antenna that consists of an array of active elements**

**2.3 Hyperlink BR CPM site**

**2.4 Other information**

At the 36th meeting of Working Party 5D, BR provided an informal document to respond some key issues that were raised during the discussions. The informal document can be found [here](https://extranet.itu.int/rsg-meetings/sg5/wp5d/_layouts/15/WopiFrame.aspx?sourcedoc=%7B4264845A-D98B-4B74-89E4-C1C7EAE73DF7%7D&file=BR_to_DG-Article_21.5_TSD_14_10_2020.docx&action=default&IsList=1&ListId=%7BB1BDD564-F90A-47A5-84D7-48479E39E8AD%7D&ListItemId=10178).

At their meetings in November 2020, WPs 4A and 4C discussed the work being conducted by WP 5D. However, due to diverging views, no consensus was reached on how to make progress and whether or not to involve WPs 4A and 4C in that work. After these meetings, a [note](https://www.itu.int/md/R19-WP5D-C-0407/en) from the Chairmen of SGs 4 and 5 to WPs 4A, 4C and 5D was developed and issued. WPs 4A, 4C and 5D are invited to consider the agreed guidance presented in this note and take appropriate actions, accordingly.

**3. Position of the Regional Group (if available)**

* ATU
* ASMG
* CEPT
* CITEL
* RCC

**4. Position of International Organizations (if available)**

* ICAO
* IMO
* WMO
* IARU R3
* Etc…