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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-09****(Rev.1)** |
| 19 – 23 April 2021, Virtual/Online Meeting | 19 March 2021 |

Chairman, DG on AI 1.2

**brief on wrc-23 agenda item 1.2**

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

**Agenda Item 1.2:**

*To consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution* ***245 (WRC-19)****.*

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

|  |  |
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| Resolution **245 (WRC‑19)**Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz, and 10.0-10.5 GHzNote: With respect to *resolves* 1 of Resolution **245** **(WRC-19)**, CPM23-1 defined that the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available is 15 June 2021\*. | *resolves to invite ITU‑R*1 to conduct and complete in time for WRC‑23 the appropriate studies of technical, operational and regulatory issues pertaining to the possible use of the terrestrial component of IMT in the frequency bands in *resolves to invite ITU‑R*2, taking into account:– evolving needs to meet emerging demands for IMT;– technical and operational characteristics of terrestrial IMT systems that would operate in these specific frequency bands, including the evolution of IMT through advances in technology and spectrally efficient techniques;– the deployment scenarios envisaged for IMT systems and the related requirements of balanced coverage and capacity;– the needs of developing countries;– the time-frame in which spectrum would be needed;2 to conduct and complete in time for WRC‑23 the sharing and compatibility studies[[1]](#footnote-1)1, with a view to ensuring the protection of services to which the frequency band is allocated on a primary basis, without imposing additional regulatory or technical constraints on those services, and also, as appropriate, on services in adjacent bands, for the frequency bands:– 3 600-3 800 MHz and 3 300-3 400 MHz (Region 2);– 3 300-3 400 MHz (amend footnote in Region 1);– 7 025-7 125 MHz (globally);– 6 425-7 025 MHz (Region 1);– 10 000-10 500 MHz (Region 2),*resolves*1 to invite CPM23‑1 to define the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available, to ensure that studies referred to in *resolves to invite ITU‑R* can be completed in time for consideration at WRC‑23;2 to invite WRC‑23 to consider, based on the results of the above studies, additional spectrum allocations to the mobile service on a primary basis and to consider identification of frequency bands for the terrestrial component of IMT; the frequency bands to be considered being limited to part or all of the bands listed in *resolves to invite ITU‑R*2,*invites administrations*to participate actively in these studies by submitting contributions to ITU‑R. |

\* This deadline is postponed to 23 July 2021.

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| **Responsible group** | **Contributing group\*** |
| WP 5D | WP 3K, WP 3M, WP 4A, WP 4B, WP 4C, WP 5A, WP 5B, WP 5C, WP 7B, WP 7C, WP 7D |

**\*** The list of contributing group has been updated according to Corrigendum 1 to Addendum 1 of Administrative Circular CA/[251](https://www.itu.int/md/R00-CA-CIR-0251/en).

**1. Background Information**

**1.1 Which regional organization initiated this Agenda Item**

Multiple regional organizations had submitted contributions to establish this agenda item at WRC-19. A brief summary is listed below.

| **Regional organization** | **Contribution to WRC-19** | **Frequency ranges** |
| --- | --- | --- |
| CITEL | Document [11](https://www.itu.int/md/R16-WRC19-C-0011/en) (Addendum 24 Addendum 14) | between 3 300 MHz and 15.35 GHz |
| RCC | Document [12](https://www.itu.int/md/R16-WRC19-C-0012/en) (Addendum 24) | 4 400-4 990 MHz6 525-7 100 MHz |
| CEPT | Document [16](https://www.itu.int/md/R16-WRC19-C-0016/en) | n/a |
| APT | Document [24](https://www.itu.int/md/R16-WRC19-C-0024/en) (Addendum 24 Addendum 3) | 7 025-7 125 MHz |
| ASMG | Document [29](https://www.itu.int/md/R16-WRC19-C-0029/en) (Addendum 24) | 3 300-3 400 MHz3 600-3 800 MHz3 800-4 200 MHz |
| ATU | Document [46](https://www.itu.int/md/R16-WRC19-C-0046/en) (Addendum 24 Addendum 7) | 4 800-4 990 MHz5 925-6 425 MHz6 425-7 125 MHz7 125-8 500 MHz8.5-10.0 GHz10.0-10.5 GHz14.8-15.35 GHz15.35-15.63 GHz15.63-17.3 GHz |

**1.2 Other relevant information for understanding of the Agenda Item**

**1.2.1 Working structure in WP 5D related to this Agenda Item**

The following Table shows the Chairmen of WGs, SWGs and DGs of WP 5D directly related to preparatory ITU-R studies for WRC-23 AI 1.2, according to Doc. 5D/[545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 2.

**Chairmen of WGs, SWGs and DGs of WP5D directly related to WRC-23 AI 1.2**

|  |  |  |
| --- | --- | --- |
| **Group** | **Chairman** | **Drafting Groups** |
| WG SPECTRUM ASPECTS and WRC-23 Preparations | Mr. Michael KRAEMER |  |
| SWG SHARING STUDIES | Dr. Hiroyuki ATARASHI | DG IMT Parameters – Mr. Rauno RUISMÄKI |
| SWG WRC-23 ai 1.2 | Ms. Luciana CAMARGOS |  |

**1.2.2 Important deadlines**

|  |  |
| --- | --- |
| **Issue** | **Date** |
| Service/application characteristics and parameters are to be sent by the contributing groups to the responsible groups (see CA/[251](https://www.itu.int/md/R00-CA-CIR-0251/en), Annex 4) | 15 June 2021\* |
| Draft CPM text completion | WP 5D#42 (October 2022) |

\* postponed to 23 July 2021 (see Corrigendum 1 to Addendum 1 of Administrative Circular CA/[251](https://www.itu.int/md/R00-CA-CIR-0251/en)).

**1.2.3 Overlapping frequency bands**

It is noted that several agenda items have overlapping frequency bands, as shown in Table below. The Table has been updated according to Corrigendum 1 to Addendum 1 of Administrative Circular CA/[251](https://www.itu.int/md/R00-CA-CIR-0251/en). The responsible groups are invited to exchange the necessary characteristics, parameters and protection criteria to complete studies addressing mutual compatibility and sharing feasibility among the applicable services/applications. They should coordinate their work and review, as appropriate, the progress of studies so that any potential difficulties can be addressed.

**Agenda items with overlapping frequency bands**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1.2 (IMT)WP 5D** | **1.4 (HIBS)WP 5D** | **1.16 (non-GSO FSS ESIMs)WP 4A** | **1.17 (ISL)WP 4A** | **1.18 (narrowband MSS)WP 4C** |
|  | 2 010-2 025 MHz(Regions 1 & 3) |  |  | 2 010-2 025 MHz(Region 1) |
| 3 300-3 400 MHz(Regions 1 & 2) |  |  |  | 3 300-3 315 MHz3 385-3 400 MHz(Region 2) |
|  |  | 27.5-29.1 GHz (E-s)29.5-30 GHz (E-s) | 27.5-30 GHz (s-s) |  |

**1.2.4 Some information from industry**

3GPP has specified a number of operating bands for NR and LTE within the frequency range 470 MHz and 4990 MHz[[2]](#footnote-2), in which some of the operating bands cover the 3.3-3.4 and 3.6-3.8 GHz frequency band being considered under WRC-23 AI 1.2.

In response to the request on parameters for 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0‑10.5 GHz, 3GPP RAN approved a study item ([RP-200513](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_87e/Inbox/RP-200513.zip)) for providing the system parameters before the February 2021 WP 5D meeting. The study is due to complete in 3GPP RAN in December 2020.

In September 2020, 3GPP set up a new Rel-17 RAN4 WI on “Introduction of 6GHz NR licensed bands” ([RP-202114](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_89e/Docs/RP-202114.zip)) covering 6425-7125 MHz and 5925-7125 MHz.

**1.3 List of relevant ITU-R Reports/Recommendations, APT Reports/ Recommendations and ongoing studies, e.g. working documents from ITU-R and/or AWG**

Some of the relevant ITU-R documents are listed in section 1/1.2/3.1 of the draft initial working document towards draft CPM text on Agenda Item 1.2 (Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.17) as shown below:

* ITU-R Recommendation [M.2101](https://www.itu.int/rec/R-REC-M.2101/en) Modelling and simulation of IMT networks and systems for use in sharing and compatibility studies
* ITU-R Recommendation [M.2083](https://www.itu.int/rec/R-REC-M.2083/en) IMT Vision - "Framework and overall objectives of the future development of IMT for 2020 and beyond"
* ITU-R Report [M.2320](https://www.itu.int/pub/R-REP-M.2320) Future technology trends of terrestrial IMT systems
* ITU-R Report [M.2370](https://www.itu.int/pub/R-REP-M.2370) IMT Traffic estimates for the years 2020 to 2030
* ITU-R Report [M.2376](https://www.itu.int/pub/R-REP-M.2376) Technical feasibility of IMT in bands above 6 GHz
* ITU-R Report [M.2410](https://www.itu.int/pub/R-REP-M.2410) Minimum requirements related to technical performance for IMT-2020 radio interface(s)
* ITU-R Report [M.2481](https://www.itu.int/pub/R-REP-M.2481) In-band and adjacent band coexistence and compatibility studies between IMT systems in 3 300-3 400 MHz and radiolocation systems in 3 100-3 400 MHz

Some other relevant ITU-R documents for sharing and compatibility studies could be found in the liaison statements to/from WP 5D:

* Sent to the contributing groups: Documents [4A/6](https://www.itu.int/md/R19-WP4A-C-0006/en), [3K/7](https://www.itu.int/md/R19-WP3K-C-0007/en), [5C/109](https://www.itu.int/md/R19-WP5C-C-0109/en), [5B/156](https://www.itu.int/md/R19-WP5B-C-0156/en), [3K/70](https://www.itu.int/md/R19-WP3K-C-0070/en), [7C/110](https://www.itu.int/md/R19-WP7C-C-0110/en), [7B/76](https://www.itu.int/md/R19-WP7B-C-0076/en), WP5B ([5B/249](https://www.itu.int/md/R19-WP5B-C-0249/en)), WP5C ([5C/150](https://www.itu.int/md/R19-WP5C-C-0150/en)), WP7D ([7D/56](https://www.itu.int/md/R19-WP7D-C-0056/en)).
* Received from the contributing groups: Documents 5D/[150](https://www.itu.int/md/R19-WP5D-C-0150/en) (WP 7B), 5D/[151](https://www.itu.int/md/R19-WP5D-C-0151/en) (WP 7C), 5D/[227](https://www.itu.int/md/R19-WP5D-C-0227/en) (WP 5B), 5D/[233](https://www.itu.int/md/R19-WP5D-C-0233/en) (WP 5C), 5D/[245](https://www.itu.int/md/R19-WP5D-C-0245/en) (WP 3M3K), 5D/[353](https://www.itu.int/md/R19-WP5D-C-0353/en)R1 (WP 7C), 5D/[377](https://www.itu.int/md/R19-WP5D-C-0377/en) (WP 4C), 5D/[398](https://www.itu.int/md/R19-WP5D-C-0398/en) (WP 5B).

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

**2.1 What documents are being developed by the responsible group: Revising the existing ITU-R Report(s), ITU-R Recommendation(s) or developing a PDNR or a working document**

Documents being developed by WP 5D (the responsible group) are listed as below.

|  |  |  |
| --- | --- | --- |
| **Link** | **Title** | **Status** |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.9 | Working document on characteristics of terrestrial component of IMT for sharing and compatibility studies in preparation for WRC-23 | Under development |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.28 | Draft Terms of Reference for Working Party 5D Correspondence Group on IMT parameters | Agreed |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.18 | Draft framework for working document for sharing and compatibility studies of IMT systems in the frequency bands [xxx-yyy] MHz | Under development |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.17 | Draft initial working document towards draft CPM text on Agenda Item 1.2 | Under development |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.19 | Working document on sharing and compatibility studies of IMT systems in the frequency band 3 300-3 800 MHz | Under development |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.20 | Working document on sharing and compatibility studies of IMT systems in the frequency band 6 425-7 125 MHz | Under development |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.21 | Working document for sharing and compatibility studies of IMT systems in the frequency bands 10-10.5 GHz | Under development |
| Doc. [5D/545](https://www.itu.int/md/R19-WP5D-C-0545/en) Chapter 04, Att. 4.22 | Detailed workplan for WRC-23 Agenda Item 1.2 |  |

**2.2 Contentious issues in ITU-R meeting (list all issues up in the beginning and then update (removal or addition) later stage)**

Currently relevant work is ongoing.

|  |  |  |
| --- | --- | --- |
| **Relevant work** | **ITU-R meeting** | **Status** |
| Characteristics of terrestrial component of IMT for sharing and compatibility studies. | WP 5D | Under development.See section 2.1 |
| Service/application characteristics and parameters are required to conduct sharing and compatibility studies, the contributing working parties | Contributing group meetings | Under development.See section 1.3 |

* 1. **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)

WRC Resolution: Res.[**245 (WRC-19)**](https://www.itu.int/dms_pub/itu-r/oth/0c/0a/R0C0A00000D0002PDFE.pdf)

Responsible Group: WP [5D](https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/Pages/default.aspx)

Information from Responsible Group:

* Doc. 5D/[545](https://www.itu.int/md/R19-WP5D-C-0360/en) Chapter 1 (a\*), Chapter 2 Attachments 2.1, 2.2, 2.5, 2.7 to 2.9 (a) (b\*\*) & 2.11 (a), Chapter 4 (a) Attachments 4.9 (a), 4.16, 4.17 (c\*\*\*), 4.18, 4.19, 4.20, 4.21 & 4.22 (b)

\*: Relevant part

\*\*: Framework/Work Plan/Milestones/Organization of studies

\*\*\*: Working document towards draft CPM text

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

The ITU-R website of Regional preparation for WRC-23 could be referred to [here](https://www.itu.int/en/ITU-R/conferences/wrc/2023/Pages/reg-prep.aspx).

* ATU
* ASMG (March 2021)

ASMG administrations have been invited to determine priorities in the bands that can be supported, with consideration of the progress of studies in the coming meetings, with the aim of setting the appropriate conditions to protect the existing services as necessary while ensuring no restrictions are imposed on IMT applications in the bands that will be supported.

* CEPT (April 2021)

Draft Preliminary CEPT position

* 3 600-3 800 MHz (REGION 2)

TBD

* 3 300-3 400 MHz (REGION 2)

CEPT supports maintaining in the footnotes Nos. **5.429C** and **5.429D**, the regulatory provisions applicable to IMT stations in this band. In particular, IMT stations shall not cause harmful interference to, nor claim protection from, systems in the radiolocation service in various national and international operational environments, and shall meet unwanted emission levels specified in the relevant ITU-R Recommendations.

* 3 300-3 400 MHz (AMEND FOOTNOTE IN REGION 1)

CEPT does not support amendments to footnotes **5.429A** and **5.429B** which could extend them to countries north of 30° parallel north. Thus, CEPT does not support an IMT identification for the entire Region 1. Furthermore, CEPT opposes amending the footnote to change the regulatory provisions applicable to IMT stations in the band. In particular, IMT stations shall not cause harmful interference to, or claim protection from, systems in the radiolocation service in various national and international operational environments, and shall meet unwanted emission levels specified in the relevant ITU-R Recommendations. In addition, protection of FSS in the frequency band 3400-3800 MHz should also be ensured, as appropriate.

* 6 425-7 025 MHz (REGION 1)

TBD

* 7 025-7 125 MHz (GLOBALLY)

TBD

* 10 000-10 500 MHz (REGION 2)

CEPT is of the view that the result of a possible identification of the frequency band 10-10.5 GHz in Region 2 under this agenda item may have a global impact on EESS (active) in the band 10.0-10.4 GHz, as well as EESS (passive) in the band 10.6-10.7 GHz, due to the required protection of these services on a global basis. Therefore, CEPT is of the view that protection of EESS (active) and EESS (passive) systems should be ensured and identification of 10.0-10.5 GHz frequency band or parts of it for IMT in Region 2 should not impose any additional regulatory or technical constraints to EESS (active) and EESS (passive) stations because of their global coverage. It may have also an impact on airborne and naval radars operated by some CEPT countries in all Regions.

* CITEL (April 2021)

Preliminary Views

* 3 300-3 400 MHz

Some administrations support appropriate sharing and compatibility studies under Agenda Item 1.2 in the bands 3 300-3 400 MHz in Region 2.

An Administration considers it is deemed advisable to follow in detail and collaborate, as appropriate, in the protection, sharing, and compatibility studies in this frequency band for the purpose of achieving regional harmonization in the use of IMT systems without constraining the operation of services and applications that have already been identified in the RR.

* 3 600-3 800 MHz

Some administrations support studies called for in Resolution **245 (WRC-19)** with respect to the 3 600-3 800 MHz frequency band, including sharing and compatibility with a view to ensuring the protection from harmful interference and without imposing additional regulatory or technical constraints on existing primary allocated services in this band.

* 7 025-7 125 MHz

Some administrations support appropriate sharing and compatibility studies under Agenda Item 1.2 in the bands 7 025-7 125 MHz globally, considering that sharing and compatibility studies for the possible identification of IMT in this band must take into consideration the technical and operational characteristics of connection links for non-GSO systems of the MSS that are currently operating, as well as for their future development.

* 10-10.5 GHz

Some administrations supports appropriate sharing and compatibility studies under Agenda Item 1.2 in the bands 10-10.5 GHz in Region 2 in accordance with Resolution 245 (WRC-19), while ensuring the protection of existing services (in-band and, as appropriate, adjacent bands) without having additional regulatory or technical constraints imposed on these services.

* RCC (April 2021)
* **Frequency band 3300-3400 MHz**

**Region 1**

No objection for the extension of country name list in the footnotes 5.429, 5.429A, 5.429B, 5.429C, 5.429D, 5.429E, 5.429F but advocate for the protection of the RLS in-band and FSS/EESS (active) in adjacent band (i.e. above 3400 MHz and below 3300 MHz). Protection of RLS, FSS and EESS (active) should be based on ITU-R Reports ITU-R M.2481 and S.2368.

**Region 2**

No objection for identification of the band 3300-3400 MHz in Region 2 for IMT but advocate for the protection of RLS of Region 1 in-band, FSS/EESS (active) of Region 1 taking into account ITU-R Reports ITU-R M.2481 and S.2368 and results of studies be carried out by ITU-R in preparation for WRC-23.

* **3600-3800 MHz in Region 2**

If this frequency band is identified for IMT in Region 2, it is necessary to adopt relevant provisions to the RR ensuring protection of FSS and FS of Region 1.

Protection should be provided based on the results of studies carried out in ITU-R in preparation for WRC- 07, WRC-12 and WRC-15 (i.e. ITU-R Report F.2328, M.2109, S.2199, S.2368 and M .2111).

* **6425-6525 MHz (Region 1)**

No objection to the identification of the frequency band 6425-6525 MHz or parts of it for IMT. Protection of FSS stations (E-s) should be ensured by regulatory and technical conditions developed based on the results of ITU-R studies.

* **6525-7025 MHz (Region 1) and 7025-7100 MHz (Global)**

Support identification of the frequency band 6525-7100 MHz for IMT systems under the following conditions:

* insure compatibility of IMT stations with non-GSO MSS (s-E) feeder links in the band 6700-7075 MHz;
* insure compatibility of IMT stations with FSS (E-s) stations on GSO and HEO in the band 6725-7025 MHz;
* insure protection of SOS / SRS stations in the band 7100-7250 MHz from unwanted emissions of IMT stations operating in the band 6525-7100 MHz;
* not imposing regulatory or technical constrains for SOS / SRS stations operating in the band 7100-7250 MHz and keep possibility for the further use of the EESS (passive) in the 7075-7250 MHz.
* **7100-7125 MHz (Global)**

Protect existing radio services from interference in considered and adjacent bands (including space stations of SOS, SRS and EESS (passive)).

* **10.0-10.5 GHz in Region 2**

If this band is allocated to the MS and identified for IMT in Region 2:

• protection of services for which the band 10-10.5 GHz is allocated in Region 1, as well as protection of EESS (passive) in the 10.6-10.7 GHz should be ensured.

• no additional regulatory and technical constrains should be imposed on radio services in Region 1 operating in accordance with the RR.

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

* ICAO
* IMO
* WMO (APG23-1/[INF-05](https://www.apt.int/sites/default/files/2020/09/APG23-1-INF-05_Preliminary_WMO_Position_on_WRC-23.docx))

WMO is concerned regarding:

* the protection of EESS (passive) and SRS (passive) in the 6 425-7 075 MHz and 7 075-7 250 MHz frequency bands,
* the protection of EESS (passive) and SRS (passive) in the 10.6-10.7 GHz frequency band from unwanted emissions from IMT, operating within the 10.0-10.5 GHz band. WMO supports studies to determine the necessary limits to protect passive sensing operations in 10.6-10.7 GHz,
* the protection of EESS (active) in the band 10-10.4 GHz,
* the possible impact on future usage of the band 3.8-4.2 GHz used for the distribution of meteorological data.
* IARU R3 (APG23-2/[INF-23](https://www.apt.int/sites/default/files/2021/03/APG23-2-INF-23_IARU_Views.docx))

The IARU opposes the identification of the band 10.0-10.5 GHz for IMT in Region 2 as well as the introduction of a mobile service allocation in the region, which would be a necessary precursor to its identification for IMT. Spectrum sharing with a mass market deployment of mobile systems can be challenging and experiences have shown that the legal implications of national IMT licensing processes and service provider requirements tend to result in removal of national amateur service assignments which can severely affect the development of amateur radio.

Considering j) of Resolution 245 (WRC-19) notes that harmonized worldwide arrangements for IMT are “highly desirable;” it logically follows that an undesirable regional identification for IMT must be weighed against the continuing requirements of incumbent services. While studies are only invited with regard to the protection of primary services, considering k) and l) and recognizing c) of the resolution make no distinction between primary and secondary allocations with regard to the need to protect existing services.

The use and evolving needs of the amateur and amateur-satellite services must not be overlooked as an undesirable regional arrangement for IMT is being considered. The IARU requests that the special status of 10.45-10.5 GHz as a worldwide amateur-satellite allocation with no mobile allocation be respected.

* Etc…
1. 1 Including studies with respect to services in adjacent bands, as appropriate. [↑](#footnote-ref-1)
2. 3GPP TS 38.101-1, https://www.3gpp.org/ftp//Specs/archive/38\_series/38.101-1/ [↑](#footnote-ref-2)