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| **The 4th Meeting of the APT Conference Preparatory Group for WRC-19 (APG19-4)** | **APG19-4/INP-114** |
| 7 – 12 January 2019, Busan, Republic of Korea | **31 December 2018** |

**India (Republic of)**

**preliminary views on WRC-19 agenda items 1.13, 1.16, 9.1 (Issue 9.1.8)**

**Agenda Item 1.13:**

*to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution* ***238 (WRC‑15)****;*

**1. Background**

During the last APG meeting, APG (19-3) held at Perth, Australia in March 2018, India proposed priority for certain frequency ranges for identification for sharing studies for implementation of IMT 2020.

With respect to the key points raised in APG19-2 on prioritization of frequency bands, India has a preference to prioritize the following frequency bands for sharing studies:

* 24.25 -27.5 GHz
* 31.8-33.4
* 37-40.5

**1.1: Summary**

After studies carried out by TG5/1 of Study Group 5, India has more clarity of coexistence status of various services with IMT 2020 and is proposing following for IMT identification.

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|   | Frequency bands (GHz) mentioned in Resolution 238 (WRC-15) |
| 24.25-27.5 | 31.8-33.4 | 37-40.5 | 40.5-42.5 | 42.5-43.5 | 45.5-47 | 47-47.2 | 47.2-50.2 | 50.4-52.6 | 66-71 | 71-76 | 81-86 |
| IND | I | NOC | I | I | I | X | X | X | X | NOC | NOC | NOC |
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I: Support IMT identification through a new footnote in the Radio regulations based on the results of sharing and compatibility studies undertaken by ITU-R under the framework of agenda item 1.13

X: Support Further studies and potential IMT identification with priority if sharing is feasible under the framework of agenda item 1.13

NOC: Support no changes to the Radio Regulations under this band

**2. Key Considerations for CPM Text**

**2.1 Unwanted emission limit in the 24.25-27.5 GHz band**

The frequency band of 23.6-24.0 GHz is allocated to EESS (passive) globally, and a number of studies have been carried out in ITU-R Task Group 5/1 to determine the technical conditions for protection/compatibility of passive services in 23.6-24.0 GHz, leading to a range of 5G unwanted emission levels that that would be necessary to protect the EESS (passive). While some of the studies were performed on all sensors in Recommendation ITU-R RS.1861 operating in the 23.6-24.0 GHz frequency band, the results summary in draft CPM report (section 2/1.13/3.2.1.2) appears to be based on a sensitive and restrictive Sensor F3.

The results of various studies differ due to differences in the assumptions such as:

1) Antenna patterns

2) Apportionment of interference between services

3) IMT station densities

4) Interpretation of EESS (passive) protection criteria

5) Multi-operator factor

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| TG5/1 Chairman Report* Passive Sensors (ITU R.RS.1861)
* Stringent sensors F3 sensitivity
* Limitation on emission from IMT from 24.25 to 27.5 GHz
 | ATUBS: -32 to -37 dBW/200MHzUE: -28 to -30 dBW/200 MHz | 3GPP/GSABS: -37 dBW /200 MHz substantial impacts on 5G networks and servicesLarge separation bandwidth (1-1.5 GHz of lower 26 GHz unusable)BS: -32dBW/200 MHzUE: -28 dBW/200 MHz |
| IMT deployment scenarios* Antenna patterns
* Apportionment of interference between services
* IMT station densities
* Interpretation of EESS (passive) protection criteria
* Multi-operator factor
 | ASMGBS: -32 to -37 dBW/200 MHz |
| CEPT ECC 18(06) July 2018-12-25BS: -42dBW/200 MHz  |

**India proposes that APT Administrations should have a common specification for the IMT unwanted emission limits for the 23.6 to 24.0 GHz frequency band to protect EESS (passive):**

* **BS: Better than -28 dB(W/200 MHz)**
* **UE: Better than -24 dB(W/200 MHz)**

**2.2 IMT and FSS (Earth-to-space)/ISS in the 24.25-27.5 GHz and 42.5-43.5 GHz bands**

In Region 3, the frequency bands 24.65-25.25 GHz and 27-27.5 GHz and 42.5-43.5 GHz are allocated to FSS (Earth-to-space), and the frequency bands 24.45-24.75 GHz and 25.25-27.5 GHz are allocated to ISS.

Sharing studies between IMT and FSS/ISS in the 26 and 40 GHz bands, conducted as part of the work of TG 5/1, give clarity on co-existence between these services. These studies show there is a sufficient protection margin between the level of emissions that would be expected from a 5G network and the level that could potentially cause interference to FSS/ISS space stations, see section 2/1.13/3.2.1.3 and 3.2.1.4 and 3.2.4.1 in draft CPM report.

For the 26 GHz band, for the case of aggregate long-term interference from IMT stations into FSS space stations in a geostationary orbit, results showed that the calculated I/N ranged from -40.62 dB to -19 dB for the baseline case, all below the protection criteria agreed by WP 4A. When considering short term interference, all studies provided results that showed maximum I/N values ranging from -28.3 dB to -15.8 dB for the baseline case, which again satisfy the agreed short-term protection criteria. Similar results are found in study results concerning the 42.5-43.5 GHz band.

Despite this, certain conditions nevertheless being proposed which include an EIRP mask (based on elevation angle), a TRP limit per base station, and/or antenna tilting limits. Any such conditions could have a negative impact on the deployment, operation and performance of 5G networks and services. They are not required given that results of baseline studies show sufficient margins.

It should also be noted that almost all of the sharing studies that have been conducted on the potential interference from 5G networks into satellite space station receivers indicate that there is a significant margin between the level of interference calculated and level that could potentially cause interference at the satellite receiver.

**India is of the view that there is no technical justification for incorporating any regulatory provisions related to technical conditions, i.e. EIRP mask, TRP limits, epfd and/or electrical and mechanical tilting limitations on IMT-2020 base stations, for identification of the bands 24.25-27.5 GHz and 42.5-43.5 GHz in the Radio Regulation.**

In addition, as IMT is the victim of interference from FSS earth stations in these two bands, but no conditions to ensure the co-existence between the FSS transmitting earth stations and IMT receiving base stations and terminals operating within frequency bands of 24.25-27.5 GHz and 42.5-43.5 GHz are needed to be specified in Radio Regulation, including development of any ITU-R Recommendation, as this is a matter for the national authority.

**2.3 Unwanted emission level in the 40 GHz band**

The frequency band 36-37 GHz is allocated on a primary basis to both EESS (passive) and the MS and FS with coexistence conditions currently addressed in Resolution 752 (WRC-07). The unwanted emission level of −13 dB(m/MHz), i.e. −43 dB(W/MHz), for an IMT station, which is equivalent to −13 dBW/GHz in the frequency band 36-37 GHz, satisfies the conditions described in Resolution 752 (WRC-07) (where the sharing criteria for stations in the mobile service is −10 dBW) to coexist with the EESS (passive). From this perspective, **there is no need to define additional OOBE limit for IMT systems operating in the frequency band 37-43.5 GHz to ensure coexistence with the EESS (passive) systems operating in the frequency band 36-37 GHz**.

In addition, passive services in the frequency band 36-37 GHz share the band with active MS and FS, so the frequency band 36-37 GHz is not a pure passive band and is not listed in Footnote **5.340**. Thus, EESS (passive) observations in this frequency band already currently have to accept a certain level of interference and that situation would not change through the use of the 37-43.5 GHz band by IMT systems.

**Therefore, India is of the opinion that it is not appropriate to include this frequency band 36-37 GHz in any revision to Resolution 750 (Rev.WRC-15)**.

**2.4 Identification of 37-43.5 GHz band to IMT**

The harmonized spectrum for mobile broadband provides economies of scale and benefits to consumers and businesses especially for developing countries besides supporting global roaming. Harmonized spectrum identification also helps standardization bodies (e.g. 3GPP) to develop technology for global deployment with lesser complexities. Therefore, a global IMT identification of 37-43.5 GHz would allow each country/region to assign spectrum for IMT-2020 as per their priorities. Availability of large contiguous block of spectrum in 40 GHz band allows to address the need of higher spectrum needs in spectrum bands above 24.25 GHz.

In light of the ITU-R studies showing feasibility of sharing and the benefits of international harmonization, India proposes the following identification in various spectrum bands between 37-43.5 GHz –

(a)    37 – 40.5 GHz  : IMT identification

(b)   40.5 – 42.5 GHz  : Upgrade Mobile as Primary Service and IMT identification

(c)    42.5 – 43.5 GHz  : IMT identification

1. **Positions for CPM Text**

**3.1 26 GHz (24.25-27.5 GHz)**

**India supports a new IMT footnote for the 26 GHz range such as:**

**5.A.113b** The frequency band 24.25-27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. Resolution **750 (Rev.WRC-19)** applies. (WRC‑19)

**India supports the following methods and conditions for the band 24.25-27.5 GHz:**

1. Method A2, Alternative 2: identification to terrestrial component of IMT in 24.25-27.5 GHz (in the mobile service), including allocation of the band 24.25-25.25 GHz to the mobile service (except aeronautical mobile) on a primary basis in Regions 1 and 2.
2. Condition A2a: Option 1 – Resolution 750 (Rev. WRC-19) in Table 1-1.

Resolution 750 (Rev. WRC-15) Table 1-1 to be updated with the unwanted emission levels as below which are adequate to ensure the compatibility with EESS (passive) in the adjacent band at 23.6-24 GHz.

* **BS: Better than -28 dB(W/200 MHz)**
* **UE: Better than -24 dB(W/200 MHz)**

For all other conditions, no action is necessary due to results of sharing and compatibility studies.

**3.2 40 GHz range (37-43.5 GHz)**

While there are three sub-segments to the 40 GHz range, this should be treated in its entirety as a wider tuning range in order to support global harmonisation. In order to create a harmonised global band, a single footnote covering the frequency range should be created which covers the full range at 37-43.5 GHz should thus be supported.

**India supports creation of a new IMT footnote for the 40 GHz range along the following lines:**

**5.B.113X T**he frequency band 37-43.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations.   (WRC‑19)

**3.3 37-43.5 GHz**

**3.3.1 37-40.5 GHz**

**India supports:**

* Method C2, Alternative 2: identification to terrestrial component of IMT in 37-40.5 GHz (in the mobile service). For the conditions associated with this band, no action is necessary due to results of sharing and compatibility studies.

**3.3.2 40.5-42.5 GHz**

**India supports:**

* Method D2, Alternative 2: identification to terrestrial component of IMT in 40.5-42.5 GHz (in the mobile service), including upgrade of the existing secondary allocation to the MS in the frequency band 40.5-42.5 GHz to a primary allocation. For the conditions associated with this band, no action is necessary due to results of sharing and compatibility studies.

**3.3.3 42.5-43.5 GHz**

**India supports:**

* Method E2, Alternative 2: identification to terrestrial component of IMT in 42.5-43.5 GHz (in the mobile service). For the conditions associated with this band, no action is necessary due to results of sharing and compatibility studies.

**3.4 50 GHz range (45.5-52.6 GHz)**

**3.4.1 45.5-47 GHz**

**India supports:**

* Method F2, Alternative 2: identification to terrestrial component of IMT in 45.5-47 GHz (in the mobile service).

While no studies were done yet for this band, it is noted that the allocations in this band are same as in the band 66-71 GHz and the results for this should be applicable for the sharing studies with ISS and MSS.

In addition, the following is applied:

* + Condition F2a: TBD as no studies available
	+ Condition F2b: Option 3 – no condition necessary

**3.4.2 47-47.2 GHz**

**India supports:**

* Method G2, Alternative 2: identification to terrestrial component of IMT in 47-47.2 GHz (in the mobile service)

The following is applied:

* + Condition G2a: TBD as no studies available
	+ Condition G2b: Option 3 – no condition necessary

**3.4.3 47.2-50.2 GHz**

India supports:

* Method H2, Alternative 2: identification to terrestrial component of IMT in 47.2-50.2 GHz (in the mobile service)
	+ Condition H2a: Option 3.

For the other conditions associated with this band, no action is necessary due to results of sharing and compatibility studies. In detail, the following is applied:

* + Condition H2b: Option 8 – no condition necessary
	+ Condition H2c: Option 3 – no condition necessary
	+ Condition H2d: Option 4 – no condition necessary

**3.4.4 50.4-52.6 GHz**

**India supports:**

* Method I2, Alternative 2: identification to terrestrial component of IMT in 50.4-52.6 GHz (in the mobile service)
* Condition I2a: Option 2 Resolution 750 (Rev. WRC-19) in Table 1-1, taking into account RR No. 5.340.1.

For the other conditions associated with this band, no action is necessary due to results of sharing and compatibility studies. In detail, the following is applied:

* + Condition I2a: Option 3 – no condition necessary
	+ Condition I2b: Option 7 – no condition necessary
	+ Condition I2c: Option 4 – no condition necessary

**Agenda Item 1.16:**

*to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between* *5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution* ***239 (WRC-15)****;*

**1. Background**

Many frequency bands in the frequency range 5 150 MHz to 5 925 MHz are extensively used for Wireless access services (WAS) and Radio Local Area networks (RLANs). These services have proven to be a success in improving wireless broadband penetration, and has helped, mobile carriers increase their reliance on Wi-Fi offload, voice over-Wi-Fi, and similar applications. As technology evolves to meet increasing performance demands and traffic on broadband WAS increases, the use of wider bandwidth channels in order to support high data rates creates a need for additional spectrum. Proliferation and demand of spectrum in this frequency range is ever increasing for cheaper wireless broadband services. India has recently identified spectrum in various spectrum bands within this frequency range for deployment of WAS and RLAN.

**2. Key Considerations for CPM Text**

Resolution 239 (WRC 15), calls for ITU-R to study WAS/RLAN technical characteristics and operational requirements in the 5 GHz frequency range. It also calls for ITU-R to perform sharing and compatibility studies between WAS/RLAN applications and incumbent services in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725 5 850 MHz and 5 850-5 925 MHz while ensuring the protection of incumbent services including their current and planned use, to consider enabling outdoor WAS/RLAN operations in the band 5 150-5 350 MHz, and potential mobile service allocations to accommodate WAS/RLAN operations in the 5 350 5 470 MHz and 5 725 5 850 MHz frequency ranges, and identify potential WAS/RLAN use in 5 850 5 925 MHz frequency range.

 No studies were agreed for the frequency band 5 725-5 850 MHz. As such, WRC-15 concluded no change (NOC) for these frequency bands and established a WRC-19 agenda item to continue the work.

**3. Preliminary Views of India**

India supports Methods of no change to the Radio Regulations as follows to satisfy this agenda item-

**Frequency band 5 150-5 250 MHz :** **Method A1 -** **No change to the RR**

No changes are proposed to the RR, with the exception of the suppression of Resolution **239 (WRC-15)**. The provisions of Resolution **229 (Rev.WRC-12)** applied to RLAN in this band should be retained to protect incumbents as supported by some ITU-R studies.

**Frequency band 5 250-5 350 MHz : Method B - No change to the RR**

Only one method is proposed, with no change to the RR, except suppression of Resolution **239 (WRC‑15)**. The provisions of Resolution **229 (Rev.WRC-12)** continue to be applied to RLAN in this band to protect incumbents.

**Frequency band 5 350-5 470 MHz : Method C -** **No change to the RR**

Only one method is proposed, with no change to the RR, except suppression of Resolution **239 (WRC‑15**).

**Frequency band 5 725-5 850 MHz :** **Method D1 - No change to the RR**

No changes are proposed to the RR, with the exception of the suppression of Resolution **239 (WRC-15)**.

**Frequency band 5 850-5 925 MHz : Method E - No change to the RR**

Only one method is proposed, with no change to the RR, except suppression of Resolution **239 (WRC‑15**).

**Agenda Item 9.1 Issue 9.1.8:**

*Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work, in accordance with Resolution 958 (WRC-15)*

**1. Background**

Resolution 958 (WRC-15) calls for ITU-R to study technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum for narrowband and broadband machine-type communication (MTC) infrastructure in order to develop Recommendations, Reports and/or Handbooks, as appropriate.

ITU-R Working Party 5D (WP 5D), which is the responsible group on Agenda Item 9.1 (Issue 9.1.8), have completed the task of drafting new [Report ITU-R M.[IMT. MTC]](https://www.itu.int/md/R15-SG05-C-0099/en) - The use of the terrestrial component of International Mobile Telecommunications (IMT) for Narrowband Broadband Machine-Type Communications and have elevated it to a new report in WP 5D. The document has been submitted to Study Group 5 for consideration and action.

The CPM text for this agenda item concluded that there is no need to take any regulatory action in the Radio Regulations with respect to specific spectrum for the use of narrowband and broadband MTC applications in the Radio Regulations.

**2. Preliminary Views**

India’s is of the view that narrowband and broadband machine-type communication infrastructures should be able to use existing frequency bands allocated to MOBILE service. This includes frequency bands identified for IMT.

As concluded in the CPM text:

* there is no need to identify specific spectrum for those applications in the Radio Regulations.
* There is no need for any regulatory action in the Radio Regulations with regard to specific spectrum requirement for MTC.
* there may be other ways to address the harmonized use of spectrum to support the implementation of narrowband and broadband MTC.
* The study of technical and operational aspects including the potential harmonized spectrum usage to support the implementation of narrowband and broadband MTC infrastructures could be further accomplished through the course of the work in ITU-R Study Groups including the development of ITU-R Recommendations, Reports and/or Handbooks, as appropriate.

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