Radiocommunication Study Groups

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SPECTRUM ASPECTS &
WRC 23 PREPARATIONS

ITU-APT Foundation of India (IAFI)

PROPOSED MODIFICATIONS TO RECOMMENDATION ITU-R M.1036-6

As decided in the recent World Radio Conference in 2019 (WRC-19), ITU-R identified additional spectrum for operation of the terrestrial component of IMT in the following frequency bands -

- 24.25-27.5 GHz
- 37-43.5 GHz
- 45.5-47 GHz
- 47.2-48.2 GHz
- 66-71 GHz

Discussion

Globally harmonized spectrum and harmonized frequency arrangements for IMT are desirable to reduce the overall cost of IMT networks and terminals by providing economies of scale and facilitating deployment and cross-border coordination. With identification of spectrum bands as mentioned above for IMT by many administrations, harmonized frequency plans in the current Recommendation ITU-R M.1036-6 for these bands will be very helpful for administrations to carry out spectrum planning. Recommendation ITU R M.1036 provides various alternatives for deployments in various frequency bands depending on local/regional conditions in order to provide flexibility for different conditions.

It was agreed at the 34th meeting of WP5D in February 2020 to limit the changes in Recommendation ITU-R M.1036-6 to only adding the frequency arrangements for the bands identified at WRC-19 for implementation of IMT. It was further agreed to implement purely the consequential updates to align the text with the decisions adopted at WRC-19 in Article 5 of the RR and related Resolutions, as well as reflecting Recommendation ITU-R M.[IMT-2020.SPECS].

The 36th Meeting discussed the revision of Recommendation ITU-R M.1036-6 and details of discussion are provided in Chapter 4 of the Chairman's report of the 36th Meeting of WP5D (R19-WP5D-C-0360!H04!MSW-E).

Access to more harmonized spectrum is expected to have a significant impact on the cost of providing mobile broadband with high-capacity bandwidth which will not only have economic benefits such as jobs and growth, but it could also enhance connectivity for social benefits like e-

Health, M-Governance and education services. It is therefore essential that Recommendation ITU-R M.1036-6 be updated with frequency arrangements for spectrum bands identified at WRC-19 for implementation of IMT.

Proposal

IAFI proposes that the 37th meeting of WP5D consider minimum revision of Recommendation ITU-R M.1036-6 and update it with new frequency arrangements as per edits provided in Annexure 1 on the current **Draft Revision of Recommendation ITU-R M.1036-6**.

In case an agreement on this approach can't be reached at this meeting, it is proposed that a separate recommendation on the new mm wave bands approved at the WRC-19 be developed, while leaving the existing Rec. ITU-R M.1036-6 as it was, except for any editorial changes.

ANNEX

[PRELIMINARY] DRAFT REVISION OF RECOMMENDATION ITU-R M.1036-6 (VERSION B)

Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications in the bands identified for IMT in the Radio Regulations

(Question ITU-R 229-5/5)

(1994-1999-2003-2007-2012-2015-2019)

Summary of this revision

This revision includes frequency arrangements for the bands identified at WRC-19 for the implementation of the terrestrial component of IMT systems and strictly consequential updates to align the text with the decisions adopted at WRC-19 in Article **5** of the RR and related Resolutions, as well as reflect one newly-approved document.

It is noted that, some of the frequency bands addressed in this Recommendation are currently under study.

Scope

This Recommendation provides guidance on the selection of transmitting and receiving frequency arrangements for the terrestrial component of IMT[1] systems as well as the arrangements themselves, with a view to assisting administrations on spectrum-related technical issues relevant to the implementation and use of the terrestrial component of IMT in the bands identified in the Radio Regulations (RR)[2].

The frequency arrangements are recommended from the point of view of enabling the most effective and efficient use of the spectrum to deliver IMT services –while minimizing the impact on other systems or services in these bands– and facilitating the growth of IMT systems.

This Recommendation is complemented by other ITU-R Recommendations and Reports on IMT that provide additional details on a number of aspects including unwanted emission characteristics for the bands addressed in this Recommendation and radio interface specifications.

Keywords

IMT, frequency arrangements, terrestrial component of IMT

The ITU Radiocommunication Assembly,

considering

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[1] International Mobile Telecommunications (IMT) encompasses IMT-2000, IMT-Advanced and IMT-2020, as specified in Resolution ITU-R 56-2.

[2] See also Attachment 1 to the Annex.

considering further

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a) that the IMT-2000 radio interfaces are detailed in Recommendation ITU-R M.1457 and currently include two modes of operation – frequency division duplex (FDD) and time division duplex (TDD);

b) that the IMT-Advanced radio interfaces are detailed in Recommendation ITU-R M.2012 and include both FDD and TDD modes;

c) that the IMT-2020 radio interfaces are detailed in Recommendation ITU-R M.[IMT-2020.SPECS];

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noting

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further noting

[c) that for the frequency bands identified for IMT in accordance with the RR, the external references of detailed specification including the radio interface technology as well as further uplink/downlink combinations are contained in Recommendations ITU-R M.1457, ITU-R M.2012 and ITU-R M.[IMT-2020.SPECS]];

recognizing

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d) that implementation of IMT in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz is addressed in Resolution **212 (Rev.WRC-19)**, which notes among other aspects that the availability of the satellite component of IMT in the bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the bands identified in RR No. **5.388** would improve the overall use of IMT; [*Editor's note: Aligning with the revised noting b) of Resolution **212 (Rev.WRC-19)**.]*

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f) that, in the frequency band 1 427-1 452 MHz, mitigation measures (e.g. filters, guardbands, etc.) 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 Resolution **750 (Rev.WRC-19)**;

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recommends

that the frequency arrangements and implementations aspects contained in the Annex should be considered for the deployment of IMT in the bands identified for IMT in the RR.

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[Editor's Note: The changes and comments below have not been discussed in SWG Frequency Arrangements at the WP5D #36 meeting]

[Editor's Note: It should be noted that input contribution 5D/278, submitted by several administrations, stated further modifications to these annexes are not necessary and the text proposed in Attachment 4.1 to the Chair's Report from the 35th meeting of Working Party 5D has been stable for several meetings. WP5D is encouraged to finalize the revision to this recommendation at its next meeting in February 2021.]

Annex

Implementation aspects and frequency arrangements applicable for IMT

SECTION 1

Implementation aspects applicable to the frequency arrangements

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Sections 1 to 14 to the Annex are parts of this Recommendation, and they should be considered in their entirety when implementing frequency arrangements as appropriate.

Unwanted emission and compatibility with other services

Frequency aspects and unwanted emission parameters are contained in Resolutions **243 (WRC-19)**, **750 (Rev.WRC-19)**, Recommendations ITU-R M.1580, ITU-R M.1581, ITU-R M.2070 and ITU-R M.2071. Frequency arrangements may be included in Recommendation ITU-R M.1036 before the associated companion Recommendations are developed or updated to provide the generic unwanted emission characteristics of mobile and base stations using the terrestrial radio interfaces of IMT.

Limits on the maximum unwanted emission characteristics according to the relevant ITU-R Recommendations are necessary to protect other radio systems including those in adjacent bands and to help establish the coexistence between different technologies for the bands addressed in this Recommendation.

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SECTION 2

Frequency arrangements in the band 450-470 MHz

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SECTION 3

Frequency arrangements in the 470-960 MHz frequency range

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Notes to Table 2:

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Note 3: The frequency arrangements for the band 698-960 MHz have been developed taking into consideration the *recognizing* above. The frequency arrangements for PPDR systems using IMT technologies in the bands identified in Resolution **646 (Rev.WRC-19)**, are outside the scope of this Recommendation and are covered by Recommendation ITU-R M.2015. There are inherent benefits of deploying IMT technologies for PPDR applications in this band, including advantages of large coverage area and possible interoperability across the 700 and 800 MHz bands, noting the differences in operational requirements and implementations.

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SECTION 4

Frequency arrangements in the band 1 427-1 518 MHz

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Note to Table 3:

Note 1: With respect to IMT in the frequency band 1 492-1 518 MHz and the MSS in the frequency band 1 518-1 525 MHz, ITU-R studies are being conducted in accordance with Resolution **223 (Rev.WRC-19**) to provide possible technical measures to facilitate adjacent band compatibility. The implementation of the frequency arrangements and the text of this Note may need to be reviewed and revised taking into account the results of these studies, which are intended to be included in ITU-R Reports and ITU-R Recommendations, as appropriate.

Based on the current results of these ongoing studies, one of a number of possible measures to facilitate adjacent band compatibility, is for administrations to consider additional frequency separation below 1 518 MHz at the upper part of G1, G2, or G3 (e.g. a total separation of different values up to 6 MHz). Moreover, when implementing these frequency arrangements, administrations are also encouraged to take into account the results of the compatibility studies, e.g. in order to address IMT-MSS coexistence in certain areas (around seaports and airports, etc.).

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SECTION 5

Frequency arrangements in the band 1 710-2 200 MHz[32]

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SECTION 6

Frequency arrangements in the band 2 300-2 400 MHz

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[32] The 2 025-2 110 MHz band is not part of the frequency arrangements.

SECTION 7

Frequency arrangements in the band 2 500-2 690 MHz

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SECTION 8

Frequency arrangements in the 3 300-3 700 MHz frequency range

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SECTION 9

Frequency arrangements in the band 4 800-4 990 MHz

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SECTION 10

Frequency arrangements in the band 24.25-27.5 GHz

The recommended frequency arrangements for implementation of IMT in the band 24.25-27.5 GHz are summarized in Table 9 and in Fig. 10, noting the implementation aspects in Section 1 above.

TABLE 9

Frequency arrangements in the 24.25-27.5 GHz frequency range

Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (GHz)
	Mobile station transmitter (GHz)	Centre gap (GHz)	Base station transmitter (GHz)	Duplex separation (GHz)	
I1					24.25-27.5

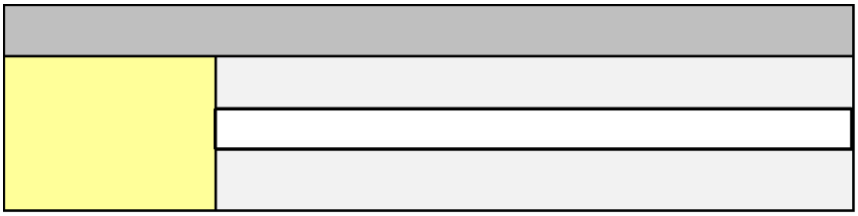
Notes to Table 9:

Note 1: Administrations should use this band solely for TDD

Note 3: To ensure protection to passive services operating in the frequency band 23.6-24 GHz, additional measures may be considered to reduce interference, in addition to the unwanted emission limits specified in Resolution **750 (Rev.WRC-19)**.

FIGURE 10

Frequency arrangement I1



SECTION 11

Frequency arrangements in the band 37-43.5 GHz

The recommended frequency arrangements for implementation of IMT in the band 37-43.5 GHz are summarized in Table 10 and in Fig. 11, noting the implementation aspects in Section 1 above.

TABLE 10

Frequency arrangements in the 37-43.5 GHz frequency range

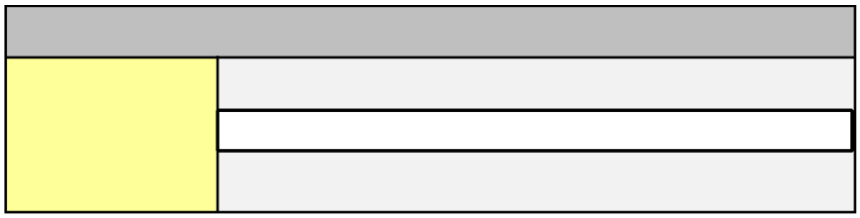
Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (GHz)
	Mobile station transmitter (GHz)	Centre gap (GHz)	Base station transmitter (GHz)	Duplex separation (GHz)	
J1					37-43.5

Notes to Table 10:

Note 1: Administrations should use this band solely for TDD

FIGURE 11

Frequency arrangement J1



SECTION 12

Frequency arrangements in the band 45.5-47 GHz

The recommended frequency arrangements for implementation of IMT in the band 45.5-47 GHz are summarized in Table 11 and in Fig. 12, noting the implementation aspects in Section 1 above.

TABLE 11

Frequency arrangements in the 45.5-47 GHz frequency range

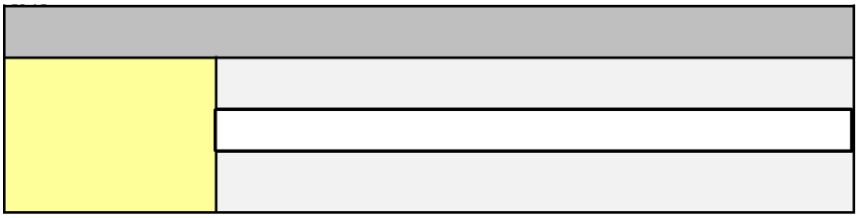
Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (GHz)
	Mobile station transmitter (GHz)	Centre gap (GHz)	Base station transmitter (GHz)	Duplex separation (GHz)	
K1					45.5-47

Notes to Table 11:

Note 1: Administrations should use this band solely for TDD

FIGURE 12

Frequency arrangement K1



SECTION 13

Frequency arrangements in the band 47.2-48.2 GHz

The recommended frequency arrangements for implementation of IMT in the band 47.2-48.2 GHz are summarized in Table 12 and in Fig. 13, noting the implementation aspects in Section 1 above.

TABLE 12

Frequency arrangements in the 47.2-48.2 GHz frequency range

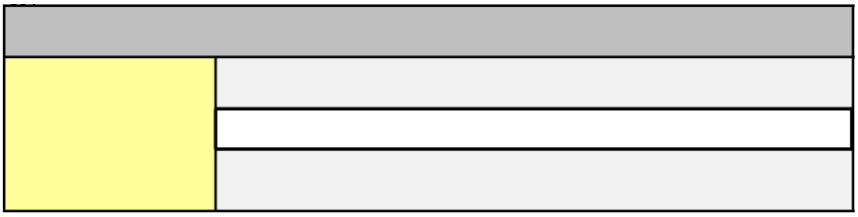
Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (GHz)
	Mobile station transmitter (GHz)	Centre gap (GHz)	Base station transmitter (GHz)	Duplex separation (GHz)	
L1					47.2-48.2

Notes to Table 12:

Note 1: Administrations should use this band solely for TDD

FIGURE 13

Frequency arrangement L1



SECTION 14

Frequency arrangements in the band 66-71 GHz

The recommended frequency arrangements for implementation of IMT in the band 66-71 GHz are summarized in Table 13 and in Fig. 14, noting the implementation aspects in Section 1 above.

TABLE 13

Frequency arrangements in the 66-71 GHz frequency range

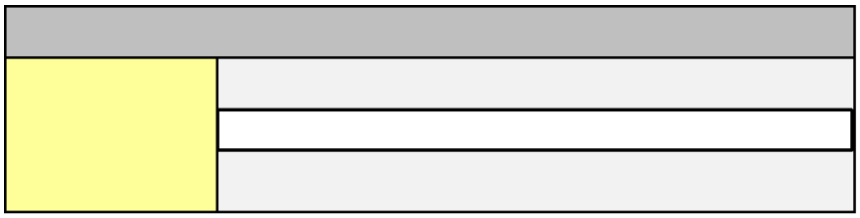
Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (GHz)
	Mobile station transmitter (GHz)	Centre gap (GHz)	Base station transmitter (GHz)	Duplex separation (GHz)	
M1					66-71

Notes to Table 13:

Note 1: Administrations should use this band solely for TDD

FIGURE 14

Frequency arrangement M1



Attachment 1[4]
to Annex

Frequency bands and associated footnotes identifying the band for IMT in Table 9 are extracted from the edition 2020 of the RR, Article **5** for ease of reference.

1 Also, administrations may deploy IMT systems in bands allocated to the mobile service other than those identified in the RR, and administrations may deploy IMT systems only in some or parts of the bands identified for IMT in the RR.

2 However, it is emphasized that the use of IMT in any band allocated to the mobile service on a primary basis but not identified for IMT should also comply with the objectives of the relevant technical and regulatory provisions of the RR, as well as with the latest version of applicable ITU-R Recommendation(s).

TABLE 9

Band	**Footnotes identifying the band for IMT**		
	Region 1	**Region 2**	**Region 3**
450-470 MHz	**5.286AA**		
470-698 MHz	**-**	**5.295, 5.308A**	**5.296A**
694/698-960 MHz	**5.317A**	**5.317A**	**5.313A, 5.317A**
1 427-1 518 MHz	**5.341A, 5.346**	**5.341B**	**5.341C, 5.346A**
1 710-2 025 MHz	**5.384A, 5.388**		
2 110-2 200 MHz	**5.388**		
2 300-2 400 MHz	**5.384A**		
2 500-2 690 MHz	**5.384A**		

TABLE 9 (*end*)

Band	**Footnotes identifying the band for IMT**		
	Region 1	**Region 2**	**Region 3**
3 300-3 400 MHz	**5.429B**	**5.429D**	**5.429F**
3 400-3 600 MHz	**5.430A**	**5.431B**	**5.432A, 5.432B, 5.433A**
3 600-3 700 MHz	**-**	**5.434**	**-**
4 800-4 990 MHz	**5.441B**	**5.441A, 5.441B**	**5.441B**
24.25-27.5 GHz	**5.532AB**		
37-43.5 GHz	**5.550B**		
45.5-47 GHz	**5.553A**	**5.553A**	**5.553A**
47.2-48.2 GHz	**5.553B**	**5.553B**	**5.553B**
66-71 GHz	**5.559AA**		

[4] See also Summary Report of the 6th Plenary Meeting of the Radiocommunication Assembly 2019 (Friday, 25 October 2019).

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Attachment 3

Related Recommendations and Reports

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Recommendation ITU-R M.2090: Specific unwanted emission limit of IMT mobile stations operating in the frequency band 694-790 MHz to facilitate protection of existing services in Region 1 in the frequency band 470-694 MHz

Recommendation ITU-RM.[IMT-2020.SPECS]: Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020) [*Note to the BR: please replace "[IMT-2020.SPECS]" with the number assigned to the IMT-2020 specification Recommendation.*]

Recommendation ITU-R SM.329: Unwanted emissions in the spurious domain

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