



# The WRC series Enabling IMT at WRC-19

October 2019

Agenda Item 1.13 at WRC-19 seeks to identify new mmWave spectrum above 24 GHz for IMT. Certain bands, such as 26 GHz and 40 GHz, already have strong multi-regional support while other bands also have significant traction such as 66-71 GHz. Global harmonisation should be possible in these three bands and realising their full potential will unlock the best performance from mmWave IMT.

The ITU-R has carried out sharing and compatibility studies between IMT and other services allocated in the bands being considered. Some of these have indicated that conditions are necessary for certain services, in particular EESS (passive). However, most of the studies for other services have shown that there is already sufficient protection margin between the level of emissions expected from IMT networks and the level that could potentially cause interference. In these cases, no conditions are necessary.

The CPM Report for Agenda Item 1.13 is now a complex compendium of many possible conditions and options. It is possible, through the current text, to identify a band for IMT on paper, but effectively render it unusable in practice. There is a risk at WRC-19 that, unless only the optimal technical conditions are applied, IMT use of the bands will be severely restricted.

Where conditions are necessary to protect other services, they should be applied. Where conditions have been found by the technical studies to be unnecessary, it will be harmful to 5G deployment to impose them without reason.

## Checklist

The ITU-R technical and regulatory work has prepared the ground for finding the optimal conditions for IMT at WRC-19.

- **Sharing studies between IMT and various services have been carried out in the range 24.25-86 GHz.**
- **These include sharing with both active and passive services, such as FSS, ISS and EESS (passive).**
- **Sharing with FSS and ISS is feasible and no technical or operational conditions on IMT are necessary.**
- **Compatibility with EESS (passive) can be ensured with appropriate regulatory measures.**
- **For other services, national or bilateral coordination is sufficient.**

# 26 GHz

**What:** Identifying 24.25-27.5 GHz for IMT.

**Why:** Potential for global harmonisation to boost mmWave 5G leading to early deployment.

**How:** For the 26 GHz band, support for IMT starts with Method A2, Alternative 2: allocate 24.25-25.25 GHz to mobile on a primary basis in Regions 1 and 2 and identify 24.25-27.5 GHz to IMT.

Unwanted emission limits will be established for IMT stations to protect EESS (passive) in the adjacent band at 23.6-24 GHz. Sharing studies for Conditions related to FSS and ISS such as A2e have shown large positive margins: no condition is necessary here.

Beyond this, technical studies have shown other conditions are not needed for a variety of reasons. Imposing additional unnecessary conditions would be harmful to 5G development in these frequencies and would create a dangerous precedence in the RRs.

**Summary:**

- **26 GHz has multi-regional support.**
- **Optimal IMT unwanted emission limits are needed to protect EESS (passive), while allowing IMT to operate. Other technical conditions are unnecessary and will hinder 5G.**
- **The 26 GHz band is adjacent to 28 GHz, allowing wide harmonisation, economies of scale and early device availability for 5G.**

## Method A2 Alternative 2

Condition	A2a: EESS passive	A2b: EESS (passive) 50 GHz (second harmonic)	A2c: EESS/SRS earth stations	A2d: FSS transmitting earth stations	A2e: FSS/ISS receiving space stations	A2f: RAS	A2g: General
Option	1-4: OOB limits	3: No conditions	5: No conditions	4: No conditions	9: No conditions	3: No conditions	5: No conditions
Reason	IMT unwanted emissions limits necessary	Existing provisions are sufficient; over 22 GHz frequency separation; would create complex precedent	Small coordination distances can be addressed on national basis	National or bilateral coordination between IMT and FSS ES	Studies show large protection margins	Small coordination distances required, to be dealt with on a national or bilateral basis	No need for any pre-requisite conditions as suggested under this Condition

# 66-71 GHz

**What:** Identifying 66-71 GHz for IMT, on a technology-neutral basis

**Why:** Additional spectrum for IMT opens the door for more use cases and leaves room for future growth of 5G

**How:** Identify the 66-71 GHz frequency band to IMT and remove the frequency band from RR No. 5.553.

66-71 GHz will become an important 5G band and has widespread support (it is expected to be used primarily on a licence-exempt

basis). The GSMA supports the identification of the band 66-71 GHz for IMT and that it should be available for use by 5G systems with flexibility to allow different licensing regimes, enabling both IMT and non-IMT technologies.

Removal of the band from RR No. 5.553 will assure co-primary status.

## Method J2 Alternative 2

Condition	J2a: MGWS / WAS	J2b: 'Other' services	J2c: Multiple services
Option	1: Invite ITU-R to develop Recs. and Reports to ensure efficient use	No conditions	3: No conditions
Reason	Band may be used for both IMT and MGWS/WAS systems	No conditions have been identified and they would not be necessary	No such prerequisite conditions are necessary, and those proposed under Options 1 and 2 are not implementable or enforceable

# 40 GHz

**What:** Identifying the whole range from 37 to 43.5 GHz for IMT.

**Why:** Provides necessary capacity for 5G and identifying the whole range offers administrations flexibility and maximises economies of scale.

**How:** Support for the whole range 37-43.5 GHz includes three different methods:

- **Method C2, Alternative 2:** identify 37-40.5 GHz to IMT
- **Method D2, Alternative 2:** upgrade to primary the existing secondary allocation to mobile in 40.5-42.5 GHz and identify it to IMT
- **Method E2, Alternative 2:** identify 42.5-43.5 GHz to IMT

Identifying the full range to IMT will provide flexibility for administrations to use suitable parts of the globally harmonised range for IMT within their country.

Some regional groups have supported this through proposing the identification of the whole band, while others have proposed identifying those parts which they plan to use while not objecting to the other parts of the range being identified.

## Summary:

- **Identifying the whole range (37-43.5 GHz) sets the stage for a globally harmonised tuning range allowing countries to pick and choose those parts they wish to make use of.**
- **Studies show existing unwanted emission limits in 3GPP are sufficient to protect EESS (passive), and no technical conditions to protect other services are required.**

## 37-40.5 GHz: Method C2 Alternative 2

Condition	C2a: EESS passive (36-37 GHz)	C2b: FSS receiving earth stations	C2c: SRS receiving earth stations (37-38 GHz)	C2d: EESS/SRS transmitting earth stations (40-40.5 GHz)	C2e: General
Option	2: No conditions	6: No conditions	3: No conditions	2: No conditions	3: No conditions
Reason	The band 36-37 GHz is shared with active services under Resolution 752 (WRC-07); existing 3GPP emission limits are sufficient	Sharing is feasible with very small separation distances and any HDFSS under 5.516B can be addressed at national/regional level	IMT coordination with SRS receiving ES is a national matter	Existing procedures for coordination of EESS/SRS ES are sufficient	No need for any pre-requisite conditions as suggested under this Condition

## 40.5-42.5 GHz: Method D2 Alternative 2

Condition	D2a: FSS receiving earth stations	D2b: RAS (42.5-43.5 GHz)	D2c: General
Option	6: No conditions	3: No conditions	3: No conditions
Reason	Sharing is feasible and any HDFSS under RR No. 5.516B in can be addressed at national/regional level	Small coordination distances required, to be dealt with on a national or bilateral basis	No need for any pre-requisite conditions as suggested under this Condition

## 42.5-43.5 GHz: Method E2 Alternative 2

Condition	E2a: FSS receiving space stations	E2b: RAS	E2c: General	E2d: FSS transmitting earth stations at known locations
Option	7: No conditions	3: No conditions	5: No conditions	3: No conditions
Reason	No mandatory technical conditions required since sharing is feasible with large margins	Small coordination distances required, to be dealt with on a national or bilateral basis	No need for any provisions for sharing among the services with co-primary allocations	National or bilateral coordination between IMT and FSS ES

## Compatibility with EESS (passive)

### 26 GHz

Ensuring compatibility with EESS (passive) in the adjacent band at 23.6-24 GHz is an important issue. EESS systems need to be protected with appropriate unwanted emissions limits. However, highly onerous limits on IMT, which would be detrimental to 5G growth, continue to be supported by some countries. These would be stifling for IMT in the 26 GHz band. Such rules would prevent mobile operators from building effective 5G networks in a large part of the 26 GHz band. An optimal limit needs to be applied which is both protective of EESS and allows IMT to function.

The GSMA has conducted technical studies on this issue in TG 5/1 and supports an OOB limits in the range of -28 to -32 dB(W/200 MHz) for IMT-2020 base stations to still protect EESS passive services. The CPM Report contains views that limits including -20 dB(W/200 MHz) can be supported. Around the world, regional groups have shown support for limits under which IMT systems can function whilst still protecting passive services such as EESS.

While implementing IMT every dB counts: an important balance has to be struck between protecting passive sensors and broadband growth.

### 40 GHz

In the 40 GHz range, the band 37-40.5 GHz has an adjacent band at 36-37 GHz which is allocated to EESS (passive). Unlike the 23.6-24 GHz band, this band is already shared with active services, with sharing conditions established in Resolution 752 (WRC-07). Studies in TG 5/1 indicate that the current unwanted emission limit in 3GPP specifications does not exceed the relevant EESS protection criterion, and therefore there is no need to tighten IMT unwanted emissions limits beyond those in 3GPP specifications.

## Sharing with FSS and ISS

Sharing studies between IMT and FSS (Earth-to-space) and ISS in the 26 GHz, 40 GHz and 50 GHz bands show there is a sufficient protection margin between the level of emissions that would be expected from IMT networks and the level that could potentially cause interference to FSS/ISS space stations.

For the 26 GHz band, in 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 for 42.5-43.5 GHz.

Despite this, certain conditions are nevertheless being proposed which include EIRP mask (based on elevation angle), TRP limit per base station, and/or restrictions on base station antenna tilting. These are not necessary conditions as the above studies have shown. The Radio Regulations does not include such conditions where margins have been shown to be positive. The positive margins in the results of sharing studies show that they are not required and 'no condition required' should be applied in this case.

## 45.5-52.6 GHz

Due to the large amount of spectrum needed for 5G services, the range 45.5-52.6 GHz also needs to be considered. Studies indicate that there is potential for the bands 45.5-47 GHz, 47.2-50.2 GHz and 50.4-52.6 GHz to be used for IMT.

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