**3GPP TSG-RAN Meeting #87e *RP-20xxxx***

**Electronic Meeting, March 16-19, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.807** | **CR** | **0001** | **rev** | **1** | **Current version:** | **16.0.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Corrections on the status of 66-71 GHz spectrum after WRC-19 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | Huawei, HiSilicon | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_NR\_beyond\_52GHz | | | | |  | ***Date:*** | | | 2020-03-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Decisions from WRC-19 on 66-71 GHz are not captured. Those decisions were made before the completion of the study item. WRC-19 (28 October to 22 November 2019) identified 66-71 GHz for IMT via footnote 5.J113.  Note 1 in Tables 4.2.1-1 and 4.2.1-2 is no longer relevant after the decisions at WRC-19.  EU/CEPT regulation updates have not been reflected properly since a while ago. The description in Section 4.2.2.1 is not aligned with regulations made in June 2019 and July 2017. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Addition of WRC-19 decisions on IMT identification of 66-71 GHz.  Corrections of obsolete text refering to studies under AI 1.13 of WRC-19.  Format adjustment.  Correction made on regulation update for Europe and CEPT. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The technical report approved in Dec 2019 at the end of the study does not reflect the correct status of the 66-71 GHz spectrum and/or Europe/CEPT at that time. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 4.1, 4.2.1, 4.2.2.1, | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

====================<Unchanged text is omitted>========================================

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TD RP-181435: "New SID: Study on NR beyond 52.6 GHz".

[3] 3GPP TR 38.805: "Study on New Radio access technology; 60 GHz unlicensed spectrum".

[4] 3GPP TR 38.913: "Study on New Radio access technology; Next Generation Access Technologies".

[5] WRC-15 Resolution 238: "Studies on frequency-related matters for International Mobile Telecommunications identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 24.25 and 86 GHz for the future development of International Mobile Telecommunications for 2020 and beyond".

[6] International Telecommunication Union, "CPM Report to WRC-19: Chapter 2, agenda item 1.13, Method C2, " https://www.itu.int/md/R15-CPM19.02-R-0001/en

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# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

B transmission bandwidth

G antenna gain

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

BS Base Station

CEPT European Conference of Postal and Telecommunications Administrations

ECC Electronic Communications Committee

ECO European Communications Office

EESS Earth Exploration Satellite Service

EIRP Equivalent Isotropic Radiated Power

ERC European Research Council

FDD Frequency Duplex Division

FS Fixed Service

FSS Fixed Satellite Service

HDMI High-Definition Multimedia Interface

IAB Integrated Access Backhaul

ICASA Independent Communication Authority of South Africa

IMT International Mobile Telecommunications

ISM Industrial, Scientific and Medical

ISS International Space Station

ITU International Telecommunication Union

LBT Listen Before Talk

MCOT Maximum Channel Occupancy Time

MSS Mobile Satellite Service

NR New Radio

OCB Occupied Bandwidth

OOBE Out-Of-Band Emission

PSD Power Spectral Density

PTP Point to point

RAS Radio Astronomy Service

RLAN Radio Local Area Network

RLS Radio Location Service

RNS Radio Navigation Satellite

RNSS Radio Navigation Satellite Service

SI Study Item

SID Study Item Description

SRD Short Range Device

SRS Space Radiocomunication Stations

TDD Time Duplex Division

UE User Equipment

V2X Vehicle to Everything

WAN Wide Area Network

WAS Wireless Access System

# 4 Operational Requirements

## 4.1 Overview of Global Spectrum Availability

In 2015, the international telecommunication union (ITU) proposed 11 millimetre-wave bands between 24 and 86 GHz to be studied towards WRC-19 for possible identification for IMT. See Table 4.1-1 with the bands studied under AI 1.13 of WRC-19 [5].

Table 4.1-1 Bands studied under AI 1.13 of WRC-19

|  |  |
| --- | --- |
| Candidate frequency bands which have allocations to the mobile service on a primary basis | Candidate frequency bands which required a co-primary mobile allocation |
| 24.25-27.5 GHz [Note1] | 31.8-33.4 GHz, |
| 37-40.5 GHz | 40.5-42.5 GHz |
| 42.5-43.5 GHz | 47-47.2 GHz |
| 45.5-47 GHz |  |
| 47.2-50.2 GHz |
| 50.4-52.6 GHz |
| 66-76 GHz |
| 81-86 GHz |
| NOTE 1: When conducting studies in the band 24.5-27.5 GHz, to take into account the need to ensure the protection of existing earth stations and the deployment of future receiving earth stations under the EESS (space-to-Earth) and SRS (space-to-Earth) allocation in the frequency band 25.5-27 GHz | |

WRC-19 (28 October to 22 November 2019) identified 66-71 GHz for IMT via footnote 5.J113 [55]: *In Regions 1 and 3, and Brazil, and Region 2 the frequency band 66-71 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 it is allocated and does not establish priority in the Radio Regulations. Resolution COM4/7 (WRC-19) applies.*

Table 4.1-2 provides information on the allocation within the frequency range 52.6 GHz to 116 GHz in ITU Radio Regulation [37]. The column with comments contains (a subset of) information on protection requirements for incumbent services. For the full details please refer to the Radio Regulations

Table 4.1-2: Frequency bands in the range 52.6 to 116 GHz in radio regulation

| Frequency band (GHz) | Allocated to Mobile Service on a primary basis | Allocated to Fixed Service on a primary basis | Comments |
| --- | --- | --- | --- |
| 52.6-54.25 | No | No | EESS (passive) and SRS (passive),  All emissions are prohibited in this band, footnote 5.340 |
| 54.25-55.78 | No | No | EESS (passive) and SRS (passive) |
| 55.78-59 | Yes | Yes | EESS (passive) and SRS (passive)  This band available for high-density applications in the fixed service, footnote 5.547 |
| 59-59.3 | Yes | Yes | EESS (passive) and SRS (passive)  Radiolocation |
| 59.3-64 | Yes | Yes | Radiolocation |
| 64-65 | Yes | Yes | This band available for high-density applications in the fixed service, footnote 5.547 |
| 65-66 | Yes | Yes | This band available for high-density applications in the fixed service, footnote 5.547 |
| 66-71 | Yes | No | Identified for IMT via footnote 5.J113 [55] |
| 71-76 | Yes | Yes | This band is mostly used by Fixed Services. |
| 76-81 | No | No | Radiolocation |
| 81-86 | Yes | Yes | This band is mostly used by Fixed Services. |
| 86-92 | No | No | EESS (passive) and SRS (passive),  All emissions are prohibited in this band, footnote 5.340 |
| 92-94 | Yes | Yes | Radiolocation |
| 94-94.1 | No | No | Radiolocation |
| 94.1-95 | Yes | Yes | Radiolocation |
| 95-100 | Yes | Yes | Radiolocation |
| 100-102 | No | No | EESS (passive) and SRS (passive),  All emissions are prohibited in this band, footnote 5.340 |
| 102-105 | Yes | Yes | N/A |
| 105-109.5 | Yes | Yes | SRS (passive) |
| 109.5-111.8 | No | No | EESS (passive) and SRS (passive),  All emissions are prohibited in this band, footnote 5.340 |
| 111.8-114.25 | Yes | Yes | SRS (passive) |
| 114.25-116 | No | No | EESS (passive) and SRS (passive),  All emissions are prohibited in this band, footnote 5.340 |

Within the range 52.6 to 116 GHz, the frequency bands 66-76 GHz (including 66-71 and 71-76 GHz) and 81-86 GHz were studied under WRC-19 Agenda Item 1.13 for potential IMT identification. Results of sharing and compatibility studies, potential technical and regulatory conditions are included in Draft CPM Report [6], and the final decisions were made in WRC-19 with respect to IMT identification or no IMT identification, along with the corresponding technical and regulatory conditions.

For 71-76 GHz, studies were carried out for the FS, RLS and FSS (space-to-Earth) indicating that sharing with FS and FSS is feasible. However, additional limits of the IMT BS and UE unwanted emissions is needed to protect RLS in the adjacent frequency band 76-81 GHz.

For 81-86 GHz, studies were carried out for the FS, FSS (Earth-to-space), RAS (in band and adjacent band), EESS (passive) and RLS. Studies were not needed for the SRS (passive), as this service is dealing with sensors around other planets and no interference issue is expected. Studies were also not carried out for the MSS. The results of those studies indicate that sharing with FS, FSS and RAS (in band and adjacent band) is feasible. Notice that additional limits of the IMT BS and UE unwanted emissions would be needed to ensure protection of EESS (passive) in the adjacent frequency band 76-81 GHz and RLS in the adjacent frequency band 86-82 GHz. Table 4.1-3 and Table 4.1-4 depicts the limits of the IMT BS and UE maximum unwanted emissions levels according to the individual compatibility studies.

Table 4.1-3: Limits of unwanted emission levels from IMT BS and UE operating on 71-76 and 81-86 GHz frequency bands into the 76-81 GHz frequency band according to WRC-19 compatibility studies

|  |  |  |
| --- | --- | --- |
| **Limits of unwanted emissions into 76-81 GHz from IMT stations** | **76-77 GHz**  **dB(W/200 MHz)** | **77-81 GHz**  **dB(W/200 MHz)** |
| BS | [TBD/−29.6/−31.5/] | [TBD/−33] |
| UE | [TBD/−20] | [TBD/−35] |

Table 4.1-4: Limits of unwanted emission levels from IMT BS and UE operating on 81-86 GHz into 86-92 GHz frequency band according to WRC-19 compatibility studies

|  |  |
| --- | --- |
| **Limits of unwanted emissions into 86-92 GHz from IMT stations** | **dB(W/100 MHz)** |
| BS | [TBD/-43.6/-49.9/-31.3/-20] |
| UE | [TBD/-43.5/-49.8/-31.2/-19.9] |

## 4.2 Country Specific Spectrum Availability and Spectrum Regulatory Requirements

### 4.2.1 Country Specific Licensing situation

Table 4.2-1 and 4.2-2 provide an overall summary of the current licensing situation for data communication (Mobile and Fixed, excluding radar based telemetry) between frequencies 52.6GHz and 100GHz for various countries under ITU region 1, 2, and 3. Symbol 'U', and 'L', represent unlicensed spectrum and licensed spectrum (including light licensing and other licensing forms), respectively. Notice that Table 4.2-1 and 4.2-2 does not include information about the service allocated to each frequency band. It neither includes information about the frequency bands studied in AI 1.13 WRC-19 which are listed in Table 4.1-1. Also, it is worthwhile noticing that type of licensing for each frequency band is a national decision.

Table 4.2.1-1: Current Licensing situation for various countries between frequency 52.6GHz and 71GHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Region | Country | Frequency (GHz) | | | | | | | | | | |
| 52.6-54.25 | 54.25-55.78 | 55.78-56.9 | 56.9-57 | 57-58.2 | 58.2-59 | 59-59.3 | 59.3-64 | 64-65 | 65-66 | 66-71 |
| **ITU Region 1** | **Europe/CEPT** |  |  |  |  | U (Mobile) | | | | | |  |
| **Israel** |  |  |  |  |  |  |  |  |  |  |  |
| **South Africa** |  |  |  |  | U (Mobile) | | | | U (Mobile) | |  |
| **ITU Region 2** | **USA** |  |  |  |  | U (Mobile) | | | | | | |
| **Canada** |  |  |  |  | U (Mobile) | | | |  |  |  |
| **Brazil** |  |  |  |  | U (Mobile) | | | |  |  |  |
| **Mexico** |  |  |  |  | U (Mobile) | | | |  |  |  |
| **ITU Region 3** | **China** |  |  |  |  |  |  | U (Mobile) | |  |  |  |
| **Japan** |  |  |  |  | U (Mobile) | | | | | |  |
| **Korea** |  |  |  |  | U (Mobile) | | | | | |  |
| **India** |  |  |  |  |  |  |  |  |  |  |  |
| **Taiwan** |  |  |  |  | U (Mobile) | | | | | |  |
| **Singapore** |  |  |  |  | U (Mobile) | | | | | |  |
| **Australia** |  |  |  |  | U (Mobile) | | | | | |  |
|  | | | | | | | | | | | | |

Table 4.2.1-2: Current Licensing situation for various countries between frequency 71GHz and 100GHz

| Region | Country | Frequency (GHz) | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 71-74 | 74-76 | 76-77 | 77-81 | 81-84 | 84-86 | 86-92 | 92-94 | 94-94.1 | 94.1-95 | 95-100 |
| **ITU Region 1** | **Europe/CEPT** | L (Fixed) | |  |  | L (Fixed) | |  | L (Fixed) | L (Fixed) | | |
| **Israel** |  |  |  |  |  |  |  |  |  |  |  |
| **South Africa** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **ITU Region 2** | **USA** | L (Fixed  /Mobile) | |  |  | L (Fixed  /Mobile) | |  | L (Fixed  /Mobile) |  | L (Fixed  /Mobile) |  |
| **Canada** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **Brazil** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **Mexico** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **ITU Region 3** | **China** |  |  |  |  |  |  |  |  |  |  |  |
| **Japan** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **Korea** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **India** |  |  |  |  |  |  |  |  |  |  |  |
| **Taiwan** | L(Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **Singapore** | L (Fixed) | |  |  | L (Fixed) | |  |  |  |  |  |
| **Australia** |  |  |  |  |  |  |  |  |  |  |  |
|  | | | | | | | | | | | | |

### 4.2.2 ITU Region 1

#### 4.2.2.1 Europe and CEPT

General information for usages in CEPT can be found in [[41]](https://www.ecodocdb.dk/document/593). When it comes to Regulation about Short Range Devices additional information can be found in [42]. Unwanted emission limits can be found in [43] and [44].

The bands above 52.6 GHz that are discussed due to WRC-19 AI 1.13 (IMT), within CEPT are three, 66-71 GHz as IMT candidate band and the bands 71-76/81-86 GHz as no IMT bands. The band 71-76 GHz, paired with 81-86 GHz, is a fixed link band important for backhauling of 5G. Therefor fixed link usage is expected to increase in the future.

From a European perspective, the focus should be on bands that are proposed for IMT as well as on the unlicensed band 57-71 GHz. The current status, seen by CEPT, for IMT bands can be found in the draft ECP, European Common Proposal and Brief for WRC-19 Agenda Item 1.13.

Table 4.2.2.1-1 and Table 4.2.2.1-2 provide summary of frequency allocations in the range of 52.6 and 114.25 GHz and regulatory requirements for existing Mobile and Fixed services in the frequency bands between 52.6 GHz and 114.25 GHz, respectively.

Table 4.2.2.1-1: Frequency bands in the range 52.6 to 100 GHz

| Frequency range in GHz | Comments | Region |
| --- | --- | --- |
| 52.6 to 54.25 | EESS service, all emissions are prohibited (footnote 5.340 of [37]) | ITU/CEPT |
| 55.78 to 57 | Recommended to be used by fixed services [40](footnote 5.547 of [37]) | ITU/CEPT |
| 57 to 66 | Several usage of Short range devices [42][45]  57-64 GHz recommended by CEPT for fixed service limited to point to point [47]  64-66 GHz recommended by CEPT for fixed service limited to point to point [46]  63-64 GHz ITS band in Europe [47]) | EC/CEPT |
| 66 to 71 | Several usage of Short range devices [42]. | EC/CEPT |
| 71 to 76 and 81 to 86 | Recommended by CEPT for fixed services [48] | CEPT |
| 77 to 81 | Automotive RADAR in Europe [49][50] | EC/CEPT |
| 86 to 92, 100 to 102, 109.5 to 111.8 | EESS service, all emissions are prohibited (footnote 5.340 of [37]) | ITU/CEPT |
| 92 to 94, 94.1 to 100, 102 to 109.5 and 111.8 to 114.25 | Recommended by CEPT for fixed services [51]) | CEPT |

Table 4.2.2.1-2: Europe/CEPT – Current Regulatory Requirements for spectrum between 52.6 GHz and 114.25 GHz

| Frequency band (GHz) | Power/Magnetic Field Requirements | Spectrum access and mitigation requirements | Modulation / maximum occupied bandwidth | Purpose/Node Placement requirements | Notes |
| --- | --- | --- | --- | --- | --- |
| 57 – 66 | 40 dBm EIRP. 23 dBm/MHz EIRP. This refers to the highest power level of the transmitter power control range during  the transmission burst if transmitter power control is implemented | Adequate spectrum sharing mechanism (e.g. Listen-before-Talk,  Detect-And-Avoid) shall be implemented by the equipment in [42].  LBT is mandatory to facilitate spectrum sharing in [56] | Not specified in [42].  Occupied channel bandwidth between 70 – 100% of nominal channel bandwidth in [56] | Short Rage Devices - Wide Data Transmissions [42] | Fixed outdoor installations are not allowed. Point-to-point links of the Fixed  Service are regulated by [46][47] |
| 66 – 71 | 40dBm EIRP.  23 dBm/MHz EIRP density | Adequate spectrum sharing mechanism [42] | Not specified in [42] | Short Rage Devices - Wide Data Transmissions [42] | Fixed outdoor installations are not allowed. |
| 71-76,  81-86 | Maximum power limit= 30dBm  Maximum EIRP= 85dBm (55 dBW)  Minimum antenna gain= Pout (dBm) + 15; or 38 (whichever is the greater)  maximum antenna gain= 85-Pout(dBm)  Complete set of specification (part 2-2 and part 3 of [52]) | Access to the frequency bands by Authorization regimes or by Block assignment/auction regimes. | An aggregation of 250 MHz channels for wider channels as defined in [53] (channel arrangements for channel sizes ranging from 250 to 4750 MHz) | Fixed Services defined in [53]  To assist the planning of fixed links, self-coordination approach, similar to the "light licensing", described in [54] can be considered. |  |
| 92-94,  94.1-100,  102-109.5,  111.8-114.25 | Not defined [51] | Not defined [51] | Radio frequency channel/block arrangements should be derived by aggregation of 250 MHz channels. Inside a specific sub-band no upper limit is given to block size, provided that the blocks´ duplex separation is maintained. Details in Annex 3 of [51] | Fixed Services defined in [51]. The choice of the appropriate assignment method and licensing regime for Fixed Service remains a decision for national administrations, based on several technical and not technical factors | To assist the planning of fixed links, self-coordination approach, similar to the “light licensing”, described in [54] can be considered. |

====================<Unchanged text is omitted>========================================