**3GPP RAN WG4 Meeting #112 [R4-2414301](http://10.10.10.10/ftp/RAN/RAN4/Inbox/R4-2414301.zip)**

Maastricht, Netherlands, 19th – 23rd August, 2024

**Source:** Huawei, HiSilicon

**Title:** TP for BS IMT parameters for range 7125 to 8400 MHz

**Agenda Item:** 8.2.3

**Document for:** Approval

# Introduction

In the last plenary (RAN#103) the Study on IMT parameters for 4400 to 4800 MHz, 7125 to 8400 MHz and 14800 to 15350 MHz was approved [1]. For frequency range 7125 to 8400 MHz and 14800 to 15350 MHz, the WF was agreed in [2] at RAN#110bis. And at RAN#111, further agreements were made in [3].

This paper provides TP for TR 38.922 on BS IMT parameters for the range 7125 to 8400 MHz.

# References

[1] RP-240787, New SI proposal: Study on IMT parameters for 4400 to 4800 MHz, 7125 to 8400 MHz and 14800 to 15350 MHz, Ericsson

[2] R4-2406615, “WF on IMT parameters for other frequency ranges”, CATT

[3] R4-2410741, “WF on IMT parameter study”, Ericsson

[4] R4-2101496, “TP to TR 38.921: remaining BS parameters”, Huawei

TP to TR 38.922

<Start of TP>

## 5.2 BS parameters

### 5.2.1 Transmitter characteristics

#### 5.2.1.1 Power dynamic range

There is no power control in downlink and fixed power per resource block is assumed during the study phase. Hence 0 dB power dynamic range was agreed for the LS reply.

#### 5.2.1.2 Spectral mask

The frequency range 7125 to 8400 MHz is just adjacent to existing NR band n104. It is proposed that existing spectral mask (Category B) for band n104 in TS 38.104 subclause 6.6.4 is applicable for the range. Category A limits are specified in Table 5.2.1.2-1 for non-AAS BS and in Table 5.2.1.2-2 for AAS BS.

|  |  |  |  |
| --- | --- | --- | --- |
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|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Table 5.2.1.2-1: Wide Area BS operating band unwanted emission limits for non-AAS BS (Category A)

| **Frequency offset of measurement filter ‑3dB point from the carrier frequency, Δf** | **Basic limits** | **Measurement Bandwidth** |
| --- | --- | --- |
| 0 MHz  f < 50MHz |  | 100 kHz |
| 50 MHz  f < min(100 MHz, fmax) | -14 dBm | 100 kHz |
| 100 MHz  f  fmax | -13 dBm | 1 MHz |
| NOTE: fmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter, where f\_offsetmax is the offset to the frequency ΔfOBUE = 100 MHz outside the downlink operating band. |

Table 5.2.1.2-2: Wide Area BS operating band unwanted emission limits for AAS BS (Category A)

| **Frequency offset of measurement filter ‑3dB point from the carrier frequency, Δf** | **Basic limits** | **Measurement Bandwidth** |
| --- | --- | --- |
| 0 MHz  f < 50MHz |  | 100 kHz |
| 50 MHz  f < min(100 MHz, fmax) | -5 dBm | 100 kHz |
| 100 MHz  f  fmax | -4 dBm | 1 MHz |
| NOTE: fmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter, where f\_offsetmax is the offset to the frequency ΔfOBUE = 100 MHz outside the downlink operating band. |

#### 5.2.1.3 ACLR

The frequency range 7125 to 8400 MHz, it is agreed to n104 ACLR. The ACLR should be higher than the value specified in Table 5.2.1.3-1.

Table 5.2.1.3-1: Base station ACLR limit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of *lowest/highest carrier* transmitted BWChannel (MHz) | BS adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90,100 | BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 38 dB |
|  | 2 x BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 38 dB |
| NOTE 1: BWChannel and BWConfig are the *BS channel bandwidth* and *transmission bandwidth configuration* of the *lowest/highest carrier* transmitted on the assigned channel frequency.NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig). |

#### 5.2.1.4 Spurious emissions

The general spurious emissions for band n104 are applicable for the frequency range 7125 to 8400 MHz. It is agreed to adopt ΔfOBUE = 40 MHz for non-AAS BS and ΔfOBUE = 100 MHz AAS BS.

Table 5.2.1.4-1: BS spurious emission limits

|  |  |  |
| --- | --- | --- |
| Spurious frequency range | Basic limit | Measurement bandwidth |
| 9 kHz – 150 kHz | -36 dBm | 1 kHz |
| 150 kHz – 30 MHz | 10 kHz |
| 30 MHz – 1 GHz | 100 kHz |
| 1 GHz – 26 GHz | -30 dBm | 1 MHz |

#### 5.2.1.5 Maximum output power

The maximum output power will be provided in the antenna parameter table. It was agreed to be aligned with antenna characteristics.

The Total Radiated Power for two polarizations was agreed as shown in Table 5.2.1.5-1 below.

Table 5.2.1.5-1: The Total Radiated Power

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Macro Sub-urban | Macro Urban | Micro Urban |
| Total Radiated Power for two polarizations (dBm) | 46 | 46 | 37 |

#### 5.2.1.6 Average output power

### It was agreed the average output power won’t be mentioned in the reply LS.5.2.2 Receiver characteristics

#### 5.2.2.1 Noise figure

For the frequency range 7125 to 8400 MHz, the typical Noise Figure for a Wide Area BS operating was agreed to be 6 dB (11 dB for Medium Range BS and 14 dB for Local Area BS).

#### 5.2.2.2 Sensitivity

The sensitivity is not a critical parameter for sharing and compatibility studies. It was agreed to not mention any value for this parameter.

#### 5.2.2.3 Blocking response

The in-band blocking requirement should apply from FUL,low - ΔfOOB to FUL,high + ΔfOOB, excluding the downlink frequency range of the FDD *operating band*. It is agreed to adopt ΔfOOB = 100 MHz for non-AAS BS and ΔfOOB = 100 MHz for AAS BS. The in-band blocking levels are reused from existing FR1 requirements.

Table 5.2.2.3-1: Base station general blocking requirement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| BS channel bandwidth of the lowest/highest carrier received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Interfering signal centre frequency minimum offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap (MHz) | Type of interfering signal |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | PREFSENS + 6 dB | Wide Area BS: -43Medium Range BS: -38Local Area BS: -35 | ±30 | 20 MHz DFT-s-OFDM NR signal15 kHz SCS, 100 RBs |
| NOTE: PREFSENS depends on the RAT.  |

#### 5.2.2.4 ACS

It is agreed to specify 42 dB ACS for the frequency range 7125 to 8400 MHz.

5.4 Antenna characteristics

5.4.1 BS antenna characteristics

5.4.1.1 Antenna model

See antenna model in sub-clause 4.4.1.1.

5.4.1.2 Antenna parameters

**Table 5.2.2.3-1: Beamforming antenna characteristics for IMT in 7125 to 8400 MHz**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Macro suburban** | **Macro urban** | **Small cell outdoor/Micro urban** | **Small cell indoor/Indoor urban** |
| **1** | **Base station Antenna Characteristics** |
| 1.1 | Antenna pattern  | Table 3 | Refer to Recommendation [ITU-R M.2101](https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.2101-0-201702-I%21%21PDF-E.pdf) | N/A |
| 1.2 | Element gain (dBi) (Note 2) | 6.4 | 6.4 | 6.4 | N/A |
| 1.3 | Horizontal/vertical 3 dB beam width of single element (degree)  | 90º for H65º for V | 90º for H65º for V | 90º for H65º for V | N/A |
| 1.4 | Horizontal/vertical front‑to‑back ratio (dB) | 30 for both H/V | 30 for both H/V | 30 for both H/V | N/A |
| 1.5 | Antenna polarization  | Linear ±45º polarized sub-array | Linear ±45º polarized sub-array | Linear ±45º polarized sub-array | N/A |
| 1.6 | Antenna array configuration (Row × Column) (Note 4) | 8 x 16  | 8 x 16  | 8 × 8  | N/A |
| 1.7 | Horizontal/Vertical radiating sub-array or element spacing (Note 5) | 0.5 of wavelength for H, 2.1 of wavelength for V | 0.5 of wavelength for H, 2.1 of wavelength for V | 0.5 of wavelength for H, 0.7 of wavelength for V | N/A |
| 1.7a | Number of element rows in sub-array | 3 | 3 | N/A | N/A |
| 1.7b | Vertical element separation in sub-array () | 0.7 of wavelength for V | 0.7 of wavelength for V | N/A | N/A |
| 1.7c | Pre-set sub-array down-tilt (degrees) (Note 6) | 3 | 3 | N/A | N/A |
| 1.8 | Array Ohmic loss (dB) (Note 2) | 2 | 2 | 2 | N/A |
| 1.9 | Conducted power (before Ohmic loss) per sub-array or element (dBm) (Note 3) | 22 | 22 | 16 | N/A |
| 1.10 | Base station horizontal coverage range (degrees) | +/-60 | +/-60 | +/-60 | N/A |
| 1.11 | Base station vertical coverage range (degrees) (Note 1) | 90-100 | 90-100 | 90-120 | N/A |
| 1.12 | Mechanical down-tilt (degrees) | 6 | 6 | N/A | N/A |
| 1.13 | Base station output power/sector (e.i.r.p.) (dBm) (Note 7) | 78.3 | 78.3 | 61.5 | N/A |

Note 1: The vertical coverage range is given in global coordinate system, i.e., 90° being at the horizon. This range includes the mechanical down-tilt given in row 1.12.

Note 2: The element gain in row 1.2 includes the loss given in row 1.8 and is per polarization.

Note 3: Conducted power values are per polarization. The conducted power per sub-array assumes 16 × 8 sub-arrays and 2 polarizations for the suburban and urban macro cases; the conducted power per element assumes 8 × 8 elements and 2 polarizations for the small cell outdoor/micro urban case. This power is typical power, there is no upper limit for Wide Area Base station (For BS class definitions, see 3GPP TS 38.104, § 4.4).

Note 4: 16 × 8 means there are 16 rows and 8 columns of radiating sub-arrays for macro suburban and macro urban cases. 8 × 8 means there are 8 rows and 8 columns of radiating elements for the small cell outdoor/micro urban case.

Note 5: For the case of 3 elements per sub-array, dv will be 2.1 wavelengths.

Note 6: The pre-set sub array down-tilt is a fixed design parameter for a base station. It is envisaged as a passive fixed (non-varying) electrical tilt within the sub-array elements.

Note 7: The base station e.i.r.p per sector is calculated as total power (including power from two orthogonal polarizations).

Note 8: Mechanical down-tilt is handled by a coordinate system transformation described in 3GPP TR 36.814 section A.2.1.6.2.

Note 9: and is the BS array antenna beam steering direction used in Table 3, they should be set so that the beam steering direction is within the vertical and horizontal coverage ranges in row 1.11 and row 1.10, respectively.

<End of TP>