**3GPP TSG-WG4 Meeting #112bis *R4-2417083***

Hefei, China, October 14 – 18, 2024

**Title:** WF on UE RF requirements for EESS protection

**Agenda Item:** 5.1

**Source:** Huawei

**Document for:** Approval

# Background

In RAN#105, the new WID on mmWave UE spurious emission was approved with the following objectives.

* For UE, specify additional spurious emission requirements of -5dBm/200Mz for 23.6-24 GHz frequency range for n257 and n258, where
  + Introduce new corresponding Network Signalling(s) and associated A-MPR(s) if needed by taking into the consideration of the relationship with the existing NS\_200, NS\_202, NS\_203, CA\_NS\_200, CA\_NS\_202 and CA\_NS\_203
  + All the power classes are considered in the above work

Previously in Rel-16, EESS was also discussed based on the outcome of WRC-19 with the following conclusions:

* Introduce new NS value for the legacy bands: n258 and n257, with modifiedMPR method, extending the applicable scope of modified MPR.
* Obsolete the requirement of -8dBm/200MHz in NS\_201.
* RAN4 agreed to apply -5dBm/200MHz after Sep, 2027. But it is not reflected in RAN4 specification that revision is needed before the requirement taking effect, given that companies didn’t come to consensus.

**Online Agreement:**

* Defining new NS values (i.e. NS\_205) considering all the power classes to meet -5 dBm/200 MHz (or -35 dBW/200 MHz) EESS passive services protection in the 23.6GHz-24GHz for band n258.
* Define the A-MPR requirements considering all the power classes to meet -5 dBm/200 MHz (or -35 dBW/200 MHz) EESS passive services protection in the 23.6GHz-24GHz for band n257
  + FFS to define the EESS protection requirements as general requirements for n257.

**<Way forward for requirements #1>**

To avoid repeated standardization efforts, the requirements in Rel-16 such as NS\_202, CA\_NS\_202 can be partly reused in Rel-19.

**<Way forward for NS signalling >**

Further analyse whether NS\_202 can be updated by just replacing +1 dBm/200 MHz with -5dBm/200MHz EESS passive services protection in the 23.6GHz-24GHz for band n257 and n258.

**<Way forward for A-MPR>**

For band n258 and band n257, evaluate A-MPR, if needed, with PC1 and PC3 for the new NS value(s), including single carrier and contiguous and non-contiguous carrier aggregation.

* NOTE: PC2/4/5/6/7 are expected to co-adopt the A-MPR agreed for PC3

For band n257, evaluate the frequency range where A-MPR is not needed to meet EESS protection of -5dBm/200MHz.

# Annex for reference

### 6.5.3 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in line with SM.329 [7] and NR operating band requirement to address UE co-existence. Spurious emissions are measured as TRP.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in Table 6.5.3-1 starting from the edge of the assigned NR channel bandwidth. The spurious emission limits in Table 6.5.3-2 apply for all transmitter band configurations (NRB) and channel bandwidths. The requirement is verified in beam locked mode with the test metric of TRP (Link=TX beam peak direction, Meas=TRP grid).

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.5.3-1: Boundary between NR out of band and spurious emission domain

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Channel bandwidth | 50  MHz | 100  MHz | 200  MHz | 400  MHz | 800 MHz | 1600 MHz | 2000 MHz |
| OOB boundary FOOB (MHz) | 100 | 200 | 400 | 800 | 1600 | 3200 | 4000 |

#### 6.5.3.2 Additional spurious emissions (SC)

##### 6.5.3.2.3 Additional spurious emission requirements for NS\_202

When "NS\_202" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.2.3-1.

Table 6.5.3.2.3-1: Additional requirements (NS\_202)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | Maximum Level | Measurement bandwidth | NOTE |
| 7.25 GHz ≤ f ≤ 2nd harmonic of the upper frequency edge of the UL operating band | -10 dBm | 100 MHz |  |
| 23.6 GHz f 24.0 GHz | +1 dBm | 200 MHz | 1 |
| NOTE 1: This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3-1 from the edge of the channel bandwidth. The protection of frequency range 23600 - 24000 MHz is meant for protection of satellite passive services. | | | |

##### 6.5.3.2.4 Additional spurious emission requirements for NS\_203

When "NS\_203" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.2.4-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3-1 from the edge of the channel bandwidth.

Table 6.5.3.2.4-1: Additional requirements (NS\_203)

|  |  |  |
| --- | --- | --- |
| Frequency band  (GHz) | Spectrum emission limit (dBm) | Measurement bandwidth |
| 23.6 f 24.0 | +1 | 200 MHz |

##### 6.5.3.2.5 Additional spurious emission requirements for NS\_204

When "NS\_204" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.2.5-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3-1 from the edge of the channel bandwidth.

Table 6.5.3.2.5-1: Additional requirements (NS\_204)

|  |  |  |
| --- | --- | --- |
| Frequency band  (GHz) | Spectrum emission limit (dBm) | Measurement bandwidth |
| 12.75 GHz ≤ f ≤ 2nd harmonic of the upper frequency edge of the UL operating band | -10 dBm | 100 MHz |
| 87,5 MHz ≤ f ≤ 118 MHz | -54 dBm | 100 kHz |
| 174 MHz ≤ f ≤ 230 MHz | -54 dBm | 100 kHz |
| 470 MHz ≤ f ≤ 694 MHz | -54 dBm | 100 kHz |

#### 6.5A.3.2 Additional spurious emissions (CA)

##### 6.5A.3.2.3 Additional spurious emission requirements for CA\_NS\_202

When "CA\_NS\_202" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.2.3-1.

##### 6.5A.3.2.4 Additional spurious emission requirements for CA\_NS\_203

When "CA\_NS\_203" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.2.4-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) as defined in section 6.5A.3.

#### 6.2.3.3 A-MPR for NS\_202

##### 6.2.3.3.1 A-MPR for NS\_202 for power class 1

For power class 1, A-MPR for NS\_202 shall be 11.0 dB.

##### 6.2.3.3.2 A-MPR for NS\_202 for power class 2

For power class 2, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.3 A-MPR for NS\_202 for power class 3

For power class 3, A-MPR for NS\_202 shall be 1.0 dB.

##### 6.2.3.3.4 A-MPR for NS\_202 for power class 4

For power class 4, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.5 A-MPR for NS\_202 for power class 5

For power class 5, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.6 A-MPR for NS\_202 for power class 6

For power class 6, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.7 A-MPR for NS\_202 for power class 7

For power class 7, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

#### 6.2A.3.3 A-MPR for CA\_NS\_202

##### 6.2A.3.3.1 A-MPR for CA\_NS\_202 for power class 1

For intra-band contiguous CA, A-MPR for CA\_NS\_202 shall be 11.0 dB.

##### 6.2A.3.3.2 A-MPR for CA\_NS\_202 for power class 2

For intra-band contiguous CA, A-MPR for CA\_NS\_202 specified in sub-clause 6.2A.3.3.3 applies.

##### 6.2A.3.3.3 A-MPR for CA\_NS\_202 for power class 3

For intra-band contiguous CA, A-MPR for CA\_NS\_202 shall be 2.0 dB.

##### 6.2A.3.3.4 A-MPR for CA\_NS\_202 for power class 4

For intra-band contiguous CA, A-MPR for CA\_NS\_202 specified in sub-clause 6.2A.3.3.3 applies.

##### 6.2A.3.3.5 A-MPR for CA\_NS\_202 for power class 5

For intra-band contiguous CA, A-MPR for CA\_NS\_202 specified in sub-clause 6.2A.3.3.3 applies.

##### 6.2A.3.3.6 A-MPR for CA\_NS\_202 for power class 6

For intra-band contiguous CA, A-MPR for CA\_NS\_202 specified in sub-clause 6.2A.3.3.3 applies.