**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, China Unicom

**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.
* NS\_201 is obsolete.
* 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.

# Way forward

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

ZTE: Not sure what the requirements refer to? Either A-MPR or additional spurious emission requirements for NS\_202, or both?

Qualcomm: this WF has the correct spirit but it may not be actionable due to non-specific nature of guideline. Moreover, NS\_203 may be the correct precedent in our view.

ZTE: Not sure if we need this WF#2. Anyway the spec shall be updated with the new EESS protection requirements. So we tent to agree with Ericsson to remove it.

**<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.

ZTE: It should be more clear: +1dBm/200MHz or -5dBm/200MHz shall be the additional spurious emission requirements, which is Table 6.5.3.2.3-1 in TS38.101-2. correct? If yes, then it would be:

Further analyse whether the additional spurious emission requirements for 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.

Qualcomm: NS\_202 does need an update, but it is out of scope for this WI because it is EU centric (-10 dBm/ 100 MHz is from ERC 74-01). For future traceability, it would be better to pursue this fix under maintenance agenda, rather than NR\_mmw\_protect.

Ericsson: Qualcomm’s comment should be further discussed: the EU Decision is clearly mentioned as one justification of this WI. Updating the 1dBm/200 MHz limit in NS\_202 would then make sense here, but we are open for further discussion.

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

Evaluate the A-MPR 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, n257

* evaluate if there is a frequency range where A-MPR is not needed to meet EESS protection of -5dBm/200MHz

FFS to define the EESS protection requirements as general requirements for n257.

ZTE: why it needs to consider intra-band non-contiguous CA here? In terms of the objective in the WID:

* + 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

My understanding is that new the -MPR(s) should be for single carrier and intra-band contiguous CA, and all the CA NS values of CA\_NS200/202/203 are for intra-band contiguous CA in the spec.

Qualcomm: Our analysis based on precedent method used for NS\_203 shows that n257 will need A-MPR specification. So we cannot presume that a ‘frequency range exists where A-MPR is not needed’ in or near n257

# 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.