**3GPP TSG-WG RAN4 Meeting #98-e *R4-2103204***

**Online, 25th January – 5th February, 2021**

**Source:** Nokia, Nokia Shanghai Bell

**Title:** TP to TR 38.847: UE Tx requirement for n262

**Agenda Item:** 9.25.1.2 [NR\_47GHz\_Band-Core]

**Document for:** Approval

# Introduction

In this contribution, UE transmitter requirement for the new NR band n262 is presented and a text proposal to TR 38.847 is attached.

# Discussion

**CA configuration**:

The tentative agreement is already made to introduce the following CA bandwidth classes for intra-band contiguous CA [2].

* At least the fallback group 3 (CA\_262G, H, I, J, K, L and M) is specified in Rel-17.

**Minimum output power/Tx off power**:

For the power class 3 UE, it is proposed to reuse the same level as n259/n260.

**ACLR:**

It’s been already agreed in [3].

* ACLR is 16 dB

**MPR:**

It is proposed to reuse the generic MPR for n262 for power class 3 UE.

**NS/A-MPR:**

It’s been agreed in [3] that

* NS definition and AMPR study shall be motivated by regulatory requirement identified in contributions

Since no specific issue is identified yet, NS/A-MPR is not introduced to n262.

**Spurious for UE coexistence:**

It is proposed that n262 UE coexistence with the US bands n260 and n261 are defined in the table below

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Spurious emission | | | | | | |
|  | Protected band/frequency range | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| n260 | NR Band 257 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | NR Band 261 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | NR Band 262 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | Frequency range | 57000 | - | 66000 | 2 | 100 |  |
| n261 | NR Band 260 | FDL\_low | - | FDL\_high | -2 | 100 |  |
|  | NR Band 262 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | Frequency range | 57000 | - | 66000 | 2 | 100 |  |
| n262 | NR Band 260 | FDL\_low | - | FDL\_high | -2 | 100 |  |
|  | NR Band 261 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | Frequency range | 57000 | - | 66000 | 2 | 100 |  |

The following agreement is made in GTW session on Jan 28, 2021.

* Agreement for PC3 minimum peak EIRP: 16.0dBm is agreed.
* Agreement for EIRP/EIS gain drop from the minimum peak EIRP/REFSENS: 13.1dB is agreed.
* Agreement for MBR: DMBP,n = 0.7 dB, DMBS,n = 0.7 dB. Note that there might be further discussion for UEs only supporting 28+47GHz*.*

The text proposal is attached in the annex, including the EIRP requirement proposed in our companion paper [5].

# Reference

[1] R4-2011873 Email discussion summary for [96e][135] NR\_47GHz\_Band Moderator (Nokia)

[2] R4-2016971 Email discussion summary for [97e][130] NR\_47GHz\_Band Moderator (Nokia)

[3] R4-2011818 WF on UE RF requirement for 47 GHz band Qualcomm

[4] R4-2016879 WF on UE RF requirement of n262 Qualcomm, Nokia, Sony

[5] R4-2100748 EIRP requirements for n262, Nokia

[6] RAN4#98e GTW agreements on Jan 28, 2021 (found in R4-2102972)

# Annex: Text Proposal to TR 38.847

<Start of Change>

Table 4.2-1: FCC requirements

|  |  |
| --- | --- |
| Channel arrangement | 47.2-47.3 GHz; 47.3-47.4 GHz; 47.4-47.5 GHz; 47.5-47.6 GHz; 47.6-47.7 GHz; 47.7-47.8 GHz; 47.8-47.9 GHz; 47.9-48.0 GHz; 48.0-48.1 GHz; and 48.1-48.2 GHz |
| Power limit (EIRP) | Base station: +75 dBm/100MHz  Mobile station: +43 dBm  Transportable station: +55 dBm |
| Unwanted emissions | -5 dBm/MHz (within 10% of channel bandwidth separation)  -13 dBm/MHz (outside more than 10% of channel bandwidth apart) |

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7 Configurations for intra-band contiguous CA **Table 7-1: NR CA configurations, bandwidth combination sets, and fallback group defined for intra-band contiguous CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configurations | BWChannel (MHz) | BWChannel (MHz) | BWChannel (MHz) | BWChannel (MHz) | BWChannel (MHz) | BWChannel (MHz) | BWChannel (MHz) | BWChannel (MHz) | Maximum aggregated  BW (MHz) | BCS | Fallback group |
| CA\_n262G | CA\_n262G | 50, 100 | 100 |  |  |  |  |  |  |  | 0 | 3 |
| CA\_n262H | CA\_n262G  CA\_n262H | 50, 100 | 100 | 100 |  |  |  |  |  |  | 0 |  |
| CA\_n262I | CA\_n262G  CA\_n262H  CA\_n262I | 50, 100 | 100 | 100 | 100 |  |  |  |  | 400 | 0 |  |
| CA\_n262J | CA\_n262G  CA\_n262H  CA\_n262I  CA\_n262J | 50, 100 | 100 | 100 | 100 | 100 |  |  |  | 500 | 0 |  |
| CA\_n262K | CA\_n262G  CA\_n262H  CA\_n262I  CA\_n262J  CA\_n262K | 50, 100 | 100 | 100 | 100 | 100 | 100 |  |  | 600 | 0 |  |
| CA\_n262L | CA\_n262G  CA\_n262H  CA\_n262I  CA\_n262J  CA\_n262K  CA\_n262L | 50, 100 | 100 | 100 | 100 | 100 | 100 | 100 |  | 700 | 0 |  |
| CA\_n262M | CA\_n262G  CA\_n262H  CA\_n262I  CA\_n262J  CA\_n262K  CA\_n262L  CA\_n262M | 50, 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 800 | 0 |  |

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### 8.1.1 Transmitter characteristics

The following requirements define the maximum output power radiated by the UE for any transmission bandwidth within the channel bandwidth for non-CA configuration, unless otherwise stated. The period of measurement shall be at least one sub frame (1ms). The minimum output power values for EIRP are found in Table 6.2.1.3-1. The requirement is verified with the test metric of total component of EIRP (Link=TX beam peak direction, Meas=Link angle). The requirement for the UE which supports a single FR2 band is specified in Table 6.2.1.3-1. The requirement for the UE which supports multiple FR2 bands is specified in both Table 6.2.1.3-1 and Table 6.2.1.3-4.

Table 6.2.1.3-1: UE minimum peak EIRP for power class 3

|  |  |
| --- | --- |
| Operating band | Min peak EIRP (dBm) |
| n262 | 16.0 |
| NOTE 1: Minimum peak EIRP is defined as the lower limit without tolerance | |

The maximum output power values for TRP and EIRP are found on the Table 6.2.1.3-2. The max allowed EIRP is derived from regulatory requirements [8]. The requirements are verified with the test metrics of TRP (Link=TX beam peak direction, Meas=TRP grid) in beam locked mode and the total component of EIRP (Link=TX beam peak direction, Meas=Link angle.

Table 6.2.1.3-2: UE maximum output power limits for power class 3

|  |  |  |
| --- | --- | --- |
| Operating band | Max TRP (dBm) | Max EIRP (dBm) |
| n262 | 23 | 43 |

The minimum EIRP at the 50th percentile of the distribution of radiated power measured over the full sphere around the UE is defined as the spherical coverage requirement and is found in Table 6.2.1.3-3 below. The requirement is verified with the test metric of the total component of EIRP (Link=Beam peak search grids, Meas=Link angle). The requirement for the UE which supports a single FR2 band is specified in Table 6.2.1.3-3. The requirement for the UE which supports multiple FR2 bands is specified in both Table 6.2.1.3-3 and Table 6.2.1.3-4.

Table 6.2.1.3-3: UE spherical coverage for power class 3

|  |  |
| --- | --- |
| Operating band | Min EIRP at 50%-tile CDF (dBm) |
| n262 | 2.9 |
| NOTE 1: Minimum EIRP at 50 %-tile CDF is defined as the lower limit without tolerance | |

For the UEs that support multiple FR2 bands, minimum requirement for peak EIRP and EIRP spherical coverage in Tables 6.2.1.3-1 and 6.2.1.3-3 shall be decreased per band, respectively, by the peak EIRP relaxation parameter MBP,n and EIRP spherical coverage relaxation parameter MBS,n, as defined in Table 6.2.1.3-4.

Table 6.2.1.3-4: UE multi-band relaxation factors for power class 3

|  |  |  |
| --- | --- | --- |
| **Band** | **MBP,n (dB)** | **MBS,n (dB)** |
| n257 | 0.73 | 0.73 |
| n258 | 0.6 | 0.7 |
| n259 | 0.5 | 0.4 |
| n260 | 0.51 | 0.41 |
| n261 | 0.52,4 | 0.74 |
| n262 | 0.7 | 0.7 |
| Note 1: n260 peak and spherical relaxations are 0 dB for UE that exclusively supports n261+n260  Note 2: n261 peak relaxation is 0 dB for UE that exclusively supports n261+n260  Note 3: n257 peak and spherical relaxations are 0 dB for UE that exclusively supports n261+n257  Note 4: n261 peak and spherical relaxations are 0 dB for UE that exclusively supports n261+n257 | | |

The minimum output power shall not exceed the values specified in Table 6.3.1.2-1 for each operating band supported. The minimum power is verified in beam locked mode with the test metric of EIRP (Link=TX beam peak direction, Meas=Link angle).

Table 6.3.1.2-1: Minimum output power for power class 3

|  |  |  |  |
| --- | --- | --- | --- |
| Operating band | Channel bandwidth  (MHz) | Minimum output power  (dBm) | Measurement bandwidth  (MHz) |
| n262 | 50 | -13 | 47.58 |
|  | 100 | -13 | 95.16 |
|  | 200 | -13 | 190.20 |
|  | 400 | -13 | 380.28 |

The transmit OFF power is defined as the TRP in the channel bandwidth when the transmitter is OFF. The transmitter is considered OFF when the UE is not allowed to transmit on any of its ports.

The transmit OFF power shall not exceed the values specified in Table 6.3.2-1 for each operating band supported. The requirement is verified with the test metric of TRP (Link=TX beam peak direction, Meas=TRP grid).

Table 6.3.2-1: Transmit OFF power

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band | Channel bandwidth / Transmit OFF power (dBm) / measurement bandwidth | | | |
|  | 50 MHz | 100 MHz | 200 MHz | 400 MHz |
| n262 | -35 | -35 | -35 | -35 |
|  | 47.58 MHz | 95.16 MHz | 190.20 MHz | 380.28 MHz |

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency. ACLR requirement is specified for a scenario in which adjacent carrier is another NRchannel.

NR Adjacent Channel Leakage power Ratio (NRACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned NR channel power and adjacent NR channel power are measured with rectangular filters with measurement bandwidths specified in Table 6.5.2.3-1.

If the measured adjacent channel power is greater than –35 dBm then the NRACLR shall be higher than the value specified in Table 6.5.2.3-1. The requirement is verified in beam locked mode with the test metric of TRP (Link=TX beam peak direction, Meas=TRP grid).

Table 6.5.2.3-1: General requirements for NRACLR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Channel bandwidth / NRACLR / Measurement bandwidth | | | |
| 50  MHz | 100  MHz | 200  MHz | 400  MHz |
| NRACLR for band n262 | 16 dB | 16 dB | 16 dB | 16 dB |
| NR channel measurement bandwidth (MHz) | 47.58 | 95.16 | 190.20 | 380.28 |
| Adjacent channel centre frequency offset (MHz) | +50  /  -50 | +100  /  -100 | +200  /  -200 | +400  /  -400 |

This table 6.5.3.1-1 specifies the requirements for coexistence with protected bands.

Table 6.5.3.1-1: Requirements

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Spurious emission | | | | | | |
|  | Protected band/frequency range | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| n260 | NR Band 257 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | NR Band 261 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | NR Band 262 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | Frequency range | 57000 | - | 66000 | 2 | 100 |  |
| n261 | NR Band 260 | FDL\_low | - | FDL\_high | -2 | 100 |  |
|  | NR Band 262 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | Frequency range | 57000 | - | 66000 | 2 | 100 |  |
| n262 | NR Band 260 | FDL\_low | - | FDL\_high | -2 | 100 |  |
|  | NR Band 261 | FDL\_low | - | FDL\_high | -5 | 100 |  |
|  | Frequency range | 57000 | - | 66000 | 2 | 100 |  |

<End of Changes>