**3GPP TSG-RAN4 Meeting #109 *R4-2318274***

**Chicago, USA, 13th Nov – 17th Nov, 2023**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-1** | **CR** | **1821** | **rev** | **-** | **Current version:** | **18.3.0** |  |
|  |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *on using this form: comprehensive instructions can be found at <http://www.3gpp.org/Change-Requests>.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | BigCR for High power UE for FDD single band PC2 |
|  |  |
| ***Source to WG:*** | China Unicom |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | HPUE\_NR\_FR1\_FDD\_R18-Core |  | ***Date:*** | 2023-11-21 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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 canbe 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Adding PC2 for FDD band n8. |
|  |  |
| ***Summary of change:*** | Adds PC2 requirments for FDD band n8. |
|  |  |
| ***Consequences if not approved:*** | Relevant high power UE requirements not supported. |
|  |  |
| ***Clauses affected:*** | 6.2.1, 6.2.3.6, 6.5.2.4.2, 7.3.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS38.521-1  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## ===================Start of 1st changes=================

### 6.2.1 UE maximum output power

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth of NR carrier unless otherwise stated. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.1-1: UE Power Class

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NRband | Class 1 (dBm) | Tolerance (dB) | Class 1.5 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) |
| n1 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n2 |  |  |  |  |  |  | 23 | ±23 |
| n3 |  |  |  |  | 26 | +2/-33 | 23 | ±23 |
| n5 |  |  |  |  |  |  | 23 | ±2 |
| n7 |  |  |  |  |  |  | 23 | ±23 |
| n8 |  |  |  |  | 26 | +2/-33 | 23 | ±23 |
| n12 |  |  |  |  |  |  | 23 | ±23 |
| n13 |  |  |  |  |  |  | 23 | ±2 |
| n14 | 316 | +2/-3 |  |  |  |  | 23 | ±2 |
| n18 |  |  |  |  |  |  | 23 | ±2 |
| n20 |  |  |  |  |  |  | 23 | ±23 |
| n24 |  |  |  |  |  |  | 23 | +2/-33 |
| n25 |  |  |  |  | 26 | +2/-33 | 23 | ±23 |
| n26 |  |  |  |  |  |  | 23 | ±23 |
| n28 |  |  |  |  |  |  | 23 | +2/-2.5 |
| n30 |  |  |  |  |  |  | 23 | ±2 |
| n34 |  |  | 295 | +2/-3 | 26 | +2/-3 | 23 | ±2 |
| n38 |  |  |  |  |  |  | 23 | ±2 |
| n39 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n40 |  |  | 295 | +2/-3 | 26 | +2/-3 | 23 | ±2 |
| n41 |  |  | 295 | +2/-33 | 26 | +2/-33 | 23 | ±23 |
| n47 |  |  |  |  |  |  | 23 | ±2 |
| n48 |  |  |  |  |  |  | 23 | +2/-3 |
| n50 |  |  |  |  |  |  | 23 | ±2 |
| n51 |  |  |  |  |  |  | 23 | ±2 |
| n53 |  |  |  |  |  |  | 23 | ±2 |
| n54 |  |  |  |  |  |  | 23 | ±2 |
| n65 |  |  |  |  |  |  | 23 | ±2 |
| n66 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n70 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n71 | 316 | +2/-3 |  |  | 26 | +2/-3 | 23 | +2/-2.5 |
| n74 |  |  |  |  |  |  | 23 | ±2 |
| n77 | 316 | +2/-3 | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |
| n78 |  |  | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |
| n79 |  |  | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |
| n80 |  |  |  |  | 26 | +2/-33 | 23 | ±23 |
| n81 |  |  |  |  |  |  | 23 | ±2 |
| n82 |  |  |  |  |  |  | 23 | ±2 |
| n83 |  |  |  |  |  |  | 23 | +2/-2.5 |
| n84 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n85 | 316 | +2/-3 |  |  |  |  | 23 | ±23 |
| n86 |  |  |  |  |  |  | 23 | ±2 |
| n89 |  |  |  |  |  |  | 23 | ±2 |
| n91 |  |  |  |  |  |  | 23 | ±23, 4 |
| n92 |  |  |  |  |  |  | 23 | ±23, 4 |
| n93 |  |  |  |  |  |  | 23 | ±23, 4 |
| n94 |  |  |  |  |  |  | 23 | ±23, 4 |
| n95 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n97 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n98 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n99 |  |  |  |  |  |  | 23 | +2/-33 |
| n100 | 316 | +2/-3 |  |  |  |  | 23 | ±2 |
| n101 | 316 | +2/-3 |  |  |  |  | 23 | ±2 |
| n104 |  |  |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n105 |  |  |  |  |  |  | 23 | +2/-2.5 |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the toleranceNOTE 2: Powerclass 3 is default power class unless otherwise statedNOTE 3: Refers to the transmission bandwidths confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high – 4 MHz and FUL\_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.NOTE 4: The maximum output power requirement is relaxed by reducing the lower tolerance limit by 0.3 dBNOTE 5: Achieved via dual TxNOTE 6: Generally, PC1 UE is not targeted for smartphone form factor. The UE power class 1 requirements for Band n14 are applicable for public safety scenario only. |

<<Unchanged omitted>>

## ===================End of 1st changes==================

## ===================Start of 2nd changes=================

### 6.2.3 UE additional maximum output power reduction

<<Unchanged omitted>>

#### 6.2.3.6 A-MPR for NS\_43 and NS\_43U

Table 6.2.3.6-1: A-MPR regions for NS\_43 (Power class 3 and 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Channel Bandwidth (MHz) | Carrier Centre Frequency, Fc (MHz) | Region A | Region B |
| RBstart | LCRB | A-MPR | RBstart | LCRB | A-MPR |
| 5 MHz | 902.5 ≤ FC < 912.5 |  | > 2.7 MHz/12/SCS  | A1 |  |  |  |
| 10 MHz | FC = 910 |  | > 7.2 MHz/12/SCS  | A2 |  | > 5.4 MHz/12/SCS | A4 |
|  | > 8.1 MHz/12/SCS  | A3 |  | > 7.2 MHz/12/SCS | A5 |
| 15 MHz | FC = 907.5 | ≤ 1.8 MHz /12/SCS | > 0 | A6 | > 1.8 MHz/12/SCS< 6.12 MHz/12/SCS | ≥ 7.2 MHz/12/SCS | A6 |
| ≥ 12.24 MHz/12/SCS | > 0 | A6 | > 1.8 MHz/12/SCS< 6.12 MHz/12/SCS | < 7.2 MHz/12/SCS | A7 |
|  |  |  | ≥ 6.12 MHz/12/SCS≤ 7.2 MHz/12/SCS | > 5.4 MHz/12/SCS | A7 |
| NOTE 1: The A-MPR values are specified in Table 6.2.3.6-2 and Table 6.2.3.6-2a.NOTE 2: Void NOTE 3: Void |

Table 6.2.3.6-2: A-MPR for NS\_43 (Power class 3)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | A1 (dB) | A2 (dB) | A3 (dB) | A4 (dB) | A5 (dB) | A6 (dB) |
|  | Outer | Inner | Outer | Inner | Outer | Inner | Outer | Inner | Outer | Inner | Outer /Inner |
| DFT-s-OFDM | Pi/2 BPSK |  | N/A | ≤ 1.5 | N/A |  |  |  | N/A |  | N/A | ≤ 9 |
|  | QPSK | ≤ 2 |  |  |  |  |  | ≤ 2.5 |  |  |  | ≤ 9 |
|  | 16 QAM |  |  |  |  |  |  |  |  | ≤ 2.5 |  | ≤ 9 |
|  | 64 QAM |  |  |  |  | ≤ 2.5 |  |  |  |  |  | ≤ 9 |
|  | 256 QAM |  |  |  |  |  |  |  |  |  |  | ≤ 9 |
| CP-OFDM | QPSK | ≤ 3.5 |  |  |  |  |  |  |  | ≤ 4 |  | ≤ 9 |
|  | 16 QAM | ≤ 3.5 |  |  |  |  |  |  |  | ≤ 4 |  | ≤ 9 |
|  | 64 QAM |  |  |  |  | ≤ 4 |  |  |  |  |  | ≤ 9 |
|  | 256 QAM |  |  |  |  |  |  |  |  |  |  | ≤ 9 |

**Table 6.2.3.6-2a: A-MPR for NS\_43 (Power Class 2)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | A1 (dB) | A2 (dB) | A3 (dB) | A4 (dB) | A5 (dB) | A6 (dB) | A7 (dB) |
|  | Outer | Inner | Outer | Inner | Outer | Inner | Outer | Inner | Outer | Inner | Outer /Inner | Outer | Inner |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 1 | N/A | ≤ 1.5 | N/A |  |  |  | N/A |  | N/A | ≤ 12 | ≤ 4 | 3 |
|  | QPSK | ≤ 3.5 |  |  |  |  |  | ≤ 3.5 |  | ≤ 5.5 |  | ≤ 12 | ≤ 4 | 3 |
|  | 16 QAM | ≤ 3.5 |  |  |  |  |  | ≤ 3.5 |  | ≤ 5.5 |  | ≤ 12 | ≤ 5 | 4 |
|  | 64 QAM | ≤ 3.5 |  | ≤ 4.5 |  | ≤ 5 |  |  |  |  |  | ≤ 12 | ≤ 5.5 | 5.5 |
|  | 256 QAM |  |  |  |  |  |  |  |  |  |  | ≤ 12 | ≤ 6.5 | 5.5 |
| CP-OFDM | QPSK | ≤ 4 |  |  |  |  |  | ≤ 4 |  | ≤ 6 |  | ≤ 12 | ≤ 6 | 4.5 |
|  | 16 QAM | ≤ 4 |  |  |  |  |  | ≤ 4.5 |  | ≤ 6 |  | ≤ 12 | ≤ 6 | 5 |
|  | 64 QAM | ≤ 4 |  | ≤ 5 |  | ≤ 6.5 |  |  |  |  |  | ≤ 12 | ≤ 6.5 | 6 |
|  | 256 QAM |  |  |  |  |  |  |  |  |  |  | ≤ 12 | ≤ 7 | 7 |

Table 6.2.3.6-3: Void

For power class 3 operation, when NS\_43U is signalled for 5 and 10 MHz channel bandwidths A-MPR is defined in Table 6.2.3.1-2 except for DFT-s-OFDM QPSK when LCRB > 5.4 MHz/12/SCS the A-MPR is 2.5 dB. For 15 MHz channel bandwidth Table 6.2.3.6-4 applies.

Table 6.2.3.6-4: A-MPR for NS\_43U

|  |  |
| --- | --- |
| Modulation/Waveform | 15 MHz |
|  | Outer /Inner (dB) |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 9 |
|  | QPSK | ≤ 9 |
|  | 16 QAM | ≤ 9 |
|  | 64 QAM | ≤ 9 |
|  | 256 QAM | ≤ 9 |
| CP-OFDM | QPSK | ≤ 9 |
|  | 16 QAM | ≤ 9 |
|  | 64 QAM | ≤ 9 |
|  | 256 QAM | ≤ 9 |

For powr class 2 operation, when NS\_43U is signalled, the larger one between the PC2 A-MPR for NS\_100 defined in Table 6.2.3.1-2 and the PC2 A-MPR for NS\_43 defined in this clause applies.

<<Unchanged omitted>>

## ===================End of 2nd changes==================

## ===================Start of 3rd changes=================

### 7.3.2 Reference sensitivity power level

<<Unchanged omitted>>

For power class 2 UEs, certain degradation of the reference sensitivity in Table 7.3.2-1a is allowed. The maximum amount of degradation is specified in Table 7.3.2-1c, and in Table 7.3.2-1d for a UE that indicates *txDiversity-r16* [15].

**Table 7.3.2-1c Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE not supporting Tx Diversity**

| Operating Band | 5MHz(dB) | 10MHz(dB) | 15MHz(dB) | 20MHz(dB) | 25MHz(dB) | 30 MHz (dB) | 35 MHz (dB) | 40MHz(dB) | 45 MHz (dB) | 50MHz(dB) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| n3 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.8 | 1.1 | 1.5 | 2.3 | 2.8 |
| n8 | 0.5 | 0.7 | 0.8 | 2.3 | 2.8 | 3.2 | 3.1 |  |  |  |
| n25 | 0.8 | 0.8 | 0.9 | 1.1 | 1.3 | 2.7 | 2.8 | 3.5 | 3.7 |  |
| n66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| n71 | 0.5 | 0.9 | 0.9 | 2.2 | 2.422.53 | 2.522.43 | 2.92 3.13 |  |  |  |
| n70 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |
| NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2.4NOTE 2: Applies to Ues that support a maximum uplink BW of 20 MHz in this band.NOTE 3: Applies to Ues that support optional symmetric UL/DL for this BW. |

**Table 7.3.2-1d Reference Sensitivity Degradation from PC3 to PC2** **for** **FDD bands for UE** **supporting Tx Diversity**

| Operating Band | 5MHz(dB) | 10MHz(dB) | 15MHz(dB) | 20MHz(dB) | 25MHz(dB) | 30 MHz (dB) | 35 MHz (dB) | 40MHz(dB) | 45 MHz (dB) | 50MHz(dB) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| n3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.6 | 1.7 | 2.8 | 5 | 5.5 | 6.0 |
| n8 | 1.3 | 1.4 | 2.1 | 5.8 | 6.1 | 6.5 | 7.0 |  |  |  |
| n25 | 1.5 | 1.5 | 1.6 | 1.6 | 1.7 | 6.0 | 6.2 | 6.7 | 7.1 |  |
| n66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| n71 | 1.1 | 1.1 | 1.7 | 5.5 | 5.92 6.93 | 6.22 7.23 | 6.52 7.33 |  |  |  |
| n70 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |
| NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2G.4NOTE 2: Applies to UEs that support a maximum uplink BW of 20 MHz in this band.NOTE 3: Applies to UEs that support optional symmetric UL/DL for this BW. |

<<Unchanged omitted>>

## ===================End of 3rd changes==================