**3GPP TSG-WG4 Meeting #94 *R4-20xxxxx***

**Athens, Greece, February 24th-28th 2020**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-3** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | **16.2.1** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | CR for TS 38.101-1: RF requirements for PC2 NR V2X | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_V2X\_NRSL-Core | | | | |  | ***Date:*** | | | 2020-02-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce PC2 NR-V2X in TS 38.101-1. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Specify the Tx UE RF requirements for PC2 NR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | PC2 NR V2X will not be supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-1 | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## **<Start of Change>**

### 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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NR  band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) |
| n1 |  |  |  |  | 23 | ±2 |
| n2 |  |  |  |  | 23 | ±23 |
| n3 |  |  |  |  | 23 | ±23 |
| n5 |  |  |  |  | 23 | ±2 |
| n7 |  |  |  |  | 23 | ±23 |
| n8 |  |  |  |  | 23 | ±23 |
| n12 |  |  |  |  | 23 | ±23 |
| n14 | 31 | +2/-3 |  |  | 23 | ±23 |
| n18 |  |  |  |  | 23 | ±2 |
| n20 |  |  |  |  | 23 | ±23 |
| n25 |  |  |  |  | 23 | ±2 |
| n28 |  |  |  |  | 23 | +2/-2.5 |
| n30 |  |  |  |  | 23 | ±2 |
| n34 |  |  |  |  | 23 | ±2 |
| n38 |  |  |  |  | 23 | ±2 |
| n39 |  |  |  |  | 23 | ±2 |
| n40 |  |  |  |  | 23 | ±2 |
| n41 |  |  | 26 | +2/-33 | 23 | ±23 |
| n47 |  |  | 26 | +2/-3 | 23 | ±2 |
| n48 |  |  |  |  | 23 | +2/-3 |
| n50 |  |  |  |  | 23 | ±2 |
| n51 |  |  |  |  | 23 | ±2 |
| n65 |  |  |  |  | 23 | ±2 |
| n66 |  |  |  |  | 23 | ±2 |
| n70 |  |  |  |  | 23 | ±2 |
| n71 |  |  |  |  | 23 | +2/-2.5 |
| n74 |  |  |  |  | 23 | ±2 |
| n77 |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n78 |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n79 |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n80 |  |  |  |  | 23 | ±2 |
| n81 |  |  |  |  | 23 | ±2 |
| n82 |  |  |  |  | 23 | ±2 |
| n83 |  |  |  |  | 23 | ±2/-2.5 |
| n84 |  |  |  |  | 23 | ±2 |
| n86 |  |  |  |  | 23 | ±2 |
| n89 |  |  |  |  | 23 | ±2 |
| n91 |  |  |  |  | 23 | ±23, 4 |
| n92 |  |  |  |  | 23 | ±23, 4 |
| n93 |  |  |  |  | 23 | ±23, 4 |
| n94 |  |  |  |  | 23 | ±23, 4 |
| n95 |  |  |  |  | 23 | ±2 |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the tolerance  NOTE 2: Powerclass 3 is default power class unless otherwise stated  NOTE 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 dB | | | | | | |

If a UE supports a different power class than the default UE power class for the band and the supported power class enables the higher maximum output power than that of the default power class:

- if the field of UE capability maxUplinkDutyCycle is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 50% (The exact evaluation period is no less than one radio frame); or

- if the field of UE capability *maxUplinkDutyCycle* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or

- if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the default power class or lower;

- shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2.4;

- else if the IE *P-Max* as defined in TS 38.331 [7] is not provided or set to the higher value than the maximum output power of the default power class and the percentage of uplink symbols transmitted in a certain evaluation period is less than or equal to *maxUplinkDutyCycle* as defined in TS 38.331; or

- if the IE *P-Max* as defined in TS 38.331 [7] is not provided or set to the higher value than the maximum output power of the default power class and the percentage of uplink symbols transmitted in a certain evaluation period is less than or equal to 50% when *maxUplinkDutyCycle* is absent. (The exact evaluation period is no less than one radio frame):

- shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2.4.

## **<Next Change>**

### 6.2E.2 UE maximum output power reduction for V2X

#### 6.2E.2.x MPR for Power class 2 V2X UE

For PSCCH and PSSCH simultaneous transmission, the allowed MPR for the maximum output power for NR V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.2.x -1for power class 2.

Table 6.2E.2.x -1 Maximum power reduction (MPR) for power class 2 NR V2X UE (PSCCH and PSSCH simultaneous transmission)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation | | MPR (dB) | | |
| Edge RB allocations | Outer RB allocations | Inner RB allocations |
| CP-OFDM | QPSK | ≤ 3.5 | | ≤ 1.5 |
| 16 QAM | ≤ 3.5 | | ≤ 2 |
| 64 QAM | ≤ 4 | | |
| 256 QAM | FFS | | |

Where the following parameters are defined to specify valid RB allocation ranges for Outer and Inner RB allocations:

NRB is the maximum number of RBs for a given Channel bandwidth and sub-carrier spacing defined in Table 5.3.2-1. RBStart,Low = max(1, floor(LCRB/2))

where max() indicates the largest value of all arguments and floor(x) is the greatest integer less than or equal to x.

RBStart,High = NRB – RBStart,Low – LCRB

The RB allocation is an Inner RB allocation if the following conditions are met

RBStart,Low ≤ RBStart ≤ RBStart,High,and

LCRB ≤ ceil(NRB/2)

where ceil(x) is the smallest integer greater than or equal to x.

An Edge RB allocation is the one for which the RB(s) is (are) allocated at the lowermost or uppermost edge of the channel with LCRB ≤ 2 RBs.

The RB allocation is an Outer RB allocation for all other allocations which are not an Inner RB allocation or Edge RB allocation.

## **<Next Change>**

### 6.2E.3 UE additional maximum output power reduction for V2X

When UE is configured for NR V2X sidelink transmissions non-concurrent with E-UTRA/NR uplink transmissions, the allowed A-MPR for the maximum output power for V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.3-1for power class 2 V2X UE.

Table 6.2E.3-1: Additional Maximum Power Reduction (A-MPR) for power class 2 V2X UE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Network Signalling value | Requirements (subclause) | NR Band | Channel bandwidth (MHz) | RB allocation method | Carrier frequency (MHz) | Resources Blocks (*N*RB) | A-MPR (dB) |
| NS\_XX | 6.6.2.2.4 (A-SEM)  6.6.3.2 (A-SE) | 47 | 10 | Contiguous allocation | 5860, 5920 | TBD | TBD |
| TBD | TBD |
| 5870, 5910 | TBD | TBD |
| 5880, 5890, 5900 | TBD | TBD |
| Non-contiguous allocation | 5860, 5920 | TBD | TBD |
| TBD | TBD |
| 5870, 5910 | TBD | TBD |
| 5880, 5890, 5900 | TBD | TBD |

## **<Next Change>**

#### 6.5E.2.4 Adjacent channel leakage ratio

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.

When UE is configured for NRV2X sidelink transmissions non-concurrent with NR/E-UTRA uplink, the requirements in Table 6.5E.2.4-1apply for power class 3 and power class 2 V2X UE.

Table 6.5E.2.4-1: ACLR for NR V2X

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Channel bandwidth /ACLR1/ Measurement bandwidth | | | | | | |
| 1.4  MHz | 3.0  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | 40  MHz |
| ACLR for Power Class 3 |  |  |  | 30 dB |  | 30 dB | 30 dB |
| ACLR for Power Class 2 |  |  |  | 31 dB |  | 31 dB | 31 dB |
| NR V2X channel Measurement bandwidth |  |  |  | 9.375 MHz |  | 19.095 MHz | 38.895 MHz |
| Adjacent channel centre frequency offset [MHz] |  |  |  | +10  /  -10 |  | +20  /  -20 | +40  /  -40 |

## **<End of Change>**