3GPP TSG-RAN WG4 Meeting # 95-e R4-2009163

Electronic Meeting, 25 May – 5 June, 2020

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| *CR-Form-v11.4* |
| **CHANGE REQUEST** |
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|  | **38.101-1** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **16.3.0** |  |
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| *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 |  |

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| ***Title:***  | DraftCR to specify MPR\AMPR requirements for PC3 NR V2X in band n47 |
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| ***Source to WG:*** | Huawei, HiSilicon, LGE |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | 5G\_V2X\_NRSL-Core |  | ***Date:*** | 2020-04-09 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***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 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | To specify MPR\AMPR requirements for PC3 NR V2X in band n47 based on the simulation results |
| ***Summary of change:*** | Specify MPR\AMPR requirements for PC3 NR V2X in band n47. |
| ***Consequences if not approved:*** | MPR\AMPR requirements for PC3 NR V2X in band n47 can’t be completed. |
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| ***Clauses affected:*** | 6.2E.2, 6.2E.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TS ... CR ... |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |

## **<Start of Changes>**

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

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E-1, this subclause specifies the allowed Maximum Power Reduction (MPR) power for NR V2X physical channels PSSCH\PSCCH, S-SSB and PSFCH.

#### 6.2E.2.1 MPR for NR V2X UE

For contiguous allocation of 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.2.1-1 for Power class 3 NR V2X UE.

Table 6.2E.2.1-1: Maximum Power Reduction (MPR) for power class 3 NR V2X (Contiguous PSCCH and PSSCH transmission)

|  |  |
| --- | --- |
| **Modulation** | **Channel bandwidth/MPR (dB)** |
| **Outer RB allocations** | **Inner RB allocations** |
| CP-OFDM  | QPSK | ≤ 4.5 | ≤ 2.5 |
| 16QAM | ≤ 4.5 | ≤ 2.5 |
| 64 QAM | ≤ 4.5 |
| 256 QAM | ≤ 7.0 |

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.

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

For single V2X UE’s PSFCH transmission for PC3 NR V2X UE, the required MPR is defined as follow

MPR\_PSFCH = 3.5 dB

For contiguous and non-contiguous allocation for simultaneous PSFCH transmission for PC3 NR V2X UE will be specified as follow

MPR\_PSFCH = CEIL {MA\_PSFCH, 0.5}

Where MA is defined as follows

MA\_PSFCH = 7.5 ; 0 ≤ NGap / NRB < 0.55

= 12 ; 0.55 ≤ NGap / NRB ≤ 1

Where

NGap is the gap RB amount between RBstart and RBend for contiguous and non-contiguous allocation simultaneous PSFCH transmission. (NGap = RBend - RBstart)

CEIL{MA, 0.5} means rounding upwards to closest 0.5dB.

The allowed MPR for the maximum output power for NR V2X physical channel S-SSB shall be specified in table 6.2E.2.1-1.

Table 6.2E.2.1-2 Maximum Power Reduction (MPR) for S-SSB transmission for power class 3 NR V2X

|  |  |
| --- | --- |
| Channel | MPR\_S-SSB (dB) |
| Outer RB allocations | Inner RB allocations |
| S-SSB | ≤ 6 | ≤ 2.5 |

For NR V2X UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) values specified in clause 6.2E.2 shall apply to the maximum output power specified in Table 6.2E.1-1. The requirements shall be met with SL MIMO configurations defined in Table 6.2D.1-2. For UE supporting SL MIMO, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector.

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2E.4 apply.

#### 6.2E.2.2 MPR for NR V2X con-current operation

For the inter-band con-current NR V2X operation, the allowed maximum power reduction (MPR) for the maximum output power shall be applied per each component carrier. The MPR requirements in subclause 6.2.2 apply for NR Uu operation in licensed band, and the MPR requirements in in subclause 6.2E.2 apply for NR sidelink operation in Band n47.

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

For the applied maximum output power reduction is obtained by taking the maximum value of MPR requirements specified in subclause 6.2E.2 and A-MPR requirements specified in subclause 6.2E.3.

Additional emission requirements can be indicated by the network or pre-configured radio parameters. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field [*additionalSpectrumEmission*]*.* Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR V2X frequency band number of the applicable operating band, the IE field [*freqBandIndicatorNR*] and an associated value of [*additionalSpectrumEmission*]in the relevant RRC information elements [7]*.*

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2.1-1. Unless stated otherwise, the total reduction to UE maximum output power is max(MPR, A-MPR) where MPR is defined in clause 6.2E.2. Outer and inner allocation notation used in clause 6.2E.3 is defined in clause 6.2E.2. In absense of modulation and waveform types the A-MPR applies to all modulation and waveform types.

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network Signalling value | Requirements (subclause) | NR V2X operating bands | Channel bandwidth (MHz) | Resources Blocks (*N*RB) | A-MPR (dB) |
| NS\_01 |  | Table 5.2E-1 | 10, 20, 30, 40 | Table 5.3.2-1 | N/A |
| NS\_33 | 6.5E.2.2.1 (A-SEM)6.5.3.2 (A-SE) | n47 | 10 | Clause 6.2E.3.1 |
| NS\_44 | 6.5.3.3.24 | n38 | 30, 40 | Clause 6.2.3.20 |
| NS\_52 | 6.5E.2.2.2 (A-SEM) | n47 | 40 | Clause 6.2E.3.2 |

Table 6.2E.3-2: Mapping of network signaling label

|  |  |
| --- | --- |
| NR V2X operating bands | Value of additionalSpectrumEmission |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| n38 | NS\_01 | NS\_44 |  |  |  |  |  |  |
| n47 | NS\_01 | NS\_33 | NS\_52 |  |  |  |  |  |
| NOTE: [*additionalSpectrumEmission*] corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. |

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the A-MPR values specified in clause 6.2.3 shall apply to the maximum output power specified in Table 6.2E.1-1. The requirements shall be met with the SL MIMO configurations specified in Table 6.2D.1-2. For UE supporting SL MIMO, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector. Unless stated otherwise, an A-MPR of 0 dB shall be used.

For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2E.4 apply.

#### 6.2E.3.1 AMPR for Power class 3 V2X UE by NS\_33

When NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the additional maximum output power reduction specified as

 A-MPR = CEIL {MA, 0.5}

Where MA is defined as follows

 MA = A-MPRBase + Gpost connector \* A-MPRStep

CEIL{MA, 0.5} means rounding upwards to closest 0.5dB.

A-MPRBase which is specified for PSCCH and PSSCH transmission\S-SSB\PSFCH below is allowed when network signalling value is provided*.* A-MPRBase is the default A-MPR value when no Gpost connector is declared. The supported post antenna connector gain Gpost connector is declared by the UE following the principle described in 38.101-1. The A-MPRstep is the increase in A-MPR allowance to allow UE to meet tighter conducted A-SE and A-SEM requirements with higher value of declared Gpost connector.

For the contiguous PSSCH and PSCCH transmission when NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements.

Table 6.2E.3.1-1: A-MPR for PSSCH/PSCCH by NS\_33 (at Fc =5860MHz)

|  |  |  |  |
| --- | --- | --- | --- |
| **Carrier frequency(MHz)** | **Resources Blocks (*L*CRB)** | **Start Resource****Block** | **A-MPRbase (dB)** |
| **QPSK/16QAM** | **64QAM** | **256QAM** |
| 5860 | ≥10 and ≤ 15 | 0 | ≤ 24 |
| ≥ 1 and ≤ 3 | ≤ 19 |
| ≥10 and ≤ 15 | ≥ 26 and ≤ 38 | ≤ 6 |
| ≥ 10 and ≤ 20 | ≥ 12 and ≤ 14 | ≤ 11 |
| ≥ 15 and ≤ 19 | ≤ 9.5 |
| ≥ 20 and ≤ 25 | ≤ 8.0 |
| ≥ 10 and ≤ 30 | ≥ 4 and ≤7 | ≤ 16 |
| ≥ 8 and ≤ 11 | ≤ 13.5 |
| ≥ 20 and ≤ 30 | ≥ 0 and ≤ 3 | ≤ 22 |
| ≥ 25 and ≤ 30 | ≥ 16 and ≤ 21 | ≤ 9.5 |
| ≥ 22 and ≤ 27 | ≤ 8.0 |
| ≥ 25 and ≤ 40 | ≥ 12 and ≤ 15 | ≤ 12 |
| ≥ 40 and ≤ 45 | 0 and 1 | ≤ 19 |
| ≥ 2 and ≤ 5 | ≤ 16 |
| ≥ 6 and ≤ 11 | ≤ 13.5 |
| ≥ 50 | ≥ 0 | ≤ 16 |
| Note 1: AMPRstep = 1.2 for RBstart = 0 or 1; AMPRstep = 0.7 for all other RBstart |

Table 6.2E.3.1-2: A-MPR for PSSCH/PSCCH by NS\_33 (at other carrier frequency)

|  |  |  |  |
| --- | --- | --- | --- |
| **Carrier frequency(MHz)** | **RB allocations** | **A-MPRbase (dB)** | **A-MPRstep** |
| **QPSK** | **16QAM** | **64QAM** | **256QAM** |
| 5870, 5880, 5890, 5900, 5910, 5920 | Inner | ≤ 3.0 | ≤ 5.0 | ≤ 6.0 | 0.5 |
| Outer | ≤ 4.5 |

For the simultaneous PSFCH transmission when NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements

Table 6.2E.3.1-3: A-MPR for simultaneous PSFCH by NS\_33

***[Editor Note] The A-MPR Table will be added***

For the S-SSB transmission when NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements

Table 6.2E.3.1-4: S-SSB transmission by NS\_33

***[Editor Note] The A-MPR Table will be added***

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#### 6.2E.3.2 AMPR for Power class 3 V2X UE by NS\_52

When NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the additional maximum output power reduction specified as

A-MPR = CEIL {MA, 0.5}

Where MA is defined as follows

 MA = A-MPR

CEIL{MA, 0.5} means rounding upwards to closest 0.5dB.

For the contiguous PSSCH and PSCCH transmission when NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements.

Table 6.2E.3.2-1: A-MPR for PSSCH/PSCCH by NS\_52

***[Editor Note] The A-MPR Table will be added***

For the simultaneous PSFCH transmission when NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements

Table 6.2E.3.2-2: A-MPR for simultaneous PSFCH by NS\_52

***[Editor Note] The A-MPR Table will be added***

For the S-SSB transmission when NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements

Table 6.2E.3.2-3: A-MPR for S-SSB transmission by NS\_52

|  |  |  |
| --- | --- | --- |
| **Carrier Frequency (MHz)** | **RBStart \* 12\*SCS****[MHz]** | **A-MPR (dB)** |
| 5885 | ≤ 7 | ≤ 16 |
| > 7 and ≤ 12 | ≤ 10.5 |
| > 12 and ≤ 19 | ≤ 4.0 |
| > 19 and ≤ 25 | ≤ 10.5 |
| > 25 | ≤ 16 |

#### 6.2E.3.3 A-MPR for NR V2X con-current operation

For the inter-band con-current NR V2X operation, the allowed additional maximum power reduction (A-MPR) for the maximum output power shall be applied per each component carrier. The A-MPR requirements in subclause 6.2.3 apply for NR Uu operation in licensed band, and the A-MPR requirements in in subclause 6.2E.3 apply for NR sidelink operation in Band n47.

## **<End of Changes>**