**3GPP TSG-WG4 Meeting #102-e *R4-220XXXX***

**Electronic Meeting, February 21 – March 3, 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **38.101-1** | **CR** | **XXX** | **rev** | **-** | **Current version:** | **17.4.0** |  |
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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:***  | Adding intra-band non-contiguous UL CA requirements for PC2 2LO and PC2&3 1LO case |
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| ***Source to WG:*** | vivo, Huawei, Skyworks |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_RF\_FR1\_enh-Core |  | ***Date:*** | 2022-02-07 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | Some of the issues in WF R4-2202340 has not been applied to the endorsed CR R4-2202298 in RAN4#101-e-bis, some conditions for 1CC requirments appliability based on 1 CC allocation were missing in the CR.In section 6.2A.2.2.2.3, there is still TBD for the case 36 ≤ B.*The contents in endorsed CR R4-2202298:**Introduce the MPR requirements comply with -30dBm/Mhz and -13dBm/MHz requirements for:** *PC2 UE with indicating dualPA-Architecture supported*
* *PC3 UE without indicating dualPA-Architecture supported*
* *PC2 UE without indicating dualPA-Architecture supported*
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| ***Summary of change:*** | Adding the 1CC requirments of 2LO case for PC2 and 1LO case for PC2 and PC3. It is based on endorsed CR R4-2202298 and revision part are highlightened.The rational of newly introduced number can reference to discussion paper [R4-2204225](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204225.zip). It should be noted that the tentative requirements are based on non-TxD case, but the case of TxD is also using the same value in [] and may subject to further revision.Add tentative value of [7] dB for the case 36 ≤ B in section 6.2A.2.2.2.3.Note: This CR should be endorsed and implemented together with another endorsed Cat A CR **R4-2204978** for 2LO for PC3 with other maintenance contents.*The contents in endorsed CR R4-2202298:**Add clause 6.2A.2.2.0 to address the hanging paragraph issue;**Add sub-clauses to separate MPR requirements to comply with 30dBm/Mhz and -13dBm/MHz requirements for PC2 and PC3 UE w/ or w/o indicating dualPA-Architecture supported.*  |
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| ***Consequences if not approved:*** | The feature to support PC2/PC3 intra-band non-contiguous UL CA for dual PA and single PA architectures is not completed. |
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| ***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 ...  |
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| ***Other comments:*** | 6.2A.2.2 |
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| ***This CR's revision history:*** |  |

## **<Start of Change>**

#### 6.2A.2.2 UE maximum output power reduction for Intra-band non-contiguous CA

##### 6.2A.2.2.0 General

For intra-band non-contiguous CA, the allowed Maximum Power Reduction (MPR) for the maximum output power is specified into 2 types: MPR to meet -30dBm/MHz and -13dBm/MHz. The UE determins the MPR type as follows:

 For UE indicating *dualPA-Architecture* supported

If OR( LCRB1 = 0, LCRB2 = 0 )

MPR defined in Table 6.2.2-1 and Table 6.2.2-2 for PC3 and PC2 UE respectively

Else If AND( FIM3,low\_block,low > SEM-13,low , FIM3,high\_block,high < SEM-13,high )

 MPR defined in Clause 6.2A.2.2.2.1 and Clause 6.2A.2.2.2.2 for PC3 and PC2 UE respectively.

Else

 MPR defined in Clause 6.2A.2.2.1.1 and Clause 6.2A.2.2.1.2 for PC3 and PC2 UE respectively.

 For UE without indicating *dualPA-Architecture* supported

If OR( LCRB1 = 0, LCRB2 = 0 )

For PC3 UE, MPR defined in Table 6.2.2-1, except for B < [**9**] MHz where [**5.5**] dB MPR is used;

For PC2 UE without indicating *TxD*, MPR defined in Table 6.2.2-2 is used, except for B < [**11.52**] MHz where [**6.5**] dB is used;

For PC2 UE indicating *TxD*, MPR defined in Table 6.2D.2-1is used, except for B < [**11.52**] MHz where the maximum value between [**6.5**] dB and MPR defined in Table 6.2D.2-1is used.

Else If AND( FIM3,low\_block,low > SEM-13,low , FIM3,high\_block,high < SEM-13,high )

 MPR defined in Clause 6.2A.2.2.2.3 and Clause 6.2A.2.2.2.4 for PC3 and PC2 UE respectively.

Else

 MPR defined in Clause 6.2A.2.2.1.3 and Clause 6.2A.2.2.1.4 for PC3 and PC2 UE respectively.

where

- FIM3,high\_block,high =(2 \* Fhigh\_alloc,high\_edge ) – Flow\_alloc,low\_edge

- FIM3,low\_block,low = (2 \* Flow\_alloc,low\_edge) – Fhigh\_alloc,high\_edge

- Flow\_alloc,low\_edge is the lowermost frequency of the lower transmission bandwidth allocation.

- Flow\_alloc,high\_edge is the uppermost frequency of the lower transmission bandwidth allocation.

- Fhigh\_alloc,low\_edge is the lowermost frequency of the upper transmission bandwidth allocation.

- Fhigh\_alloc,high\_edge is the uppermost frequency of the upper transmission bandwidth allocation.

- SEM-13,low = Threshold frequency where lower spectral emission mask below the lower channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.2.2.

- SEM-13,high = Threshold frequency where upper spectral emission mask above the upper channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.2.2.

- SEM-25,low = Threshold frequency where lower spectral emission mask below the lower channel drops from -25 dBm / MHz to -30 dBm / MHz, as specified in Clause 6.5A.2.2.2.

- SEM-25,high = Threshold frequency where upper spectral emission mask above the upper channel drops from -25 dBm / MHz to -30 dBm / MHz, as specified in Clause 6.5A.2.2.2.

MPRs in section 6.2A.2.2.1.3, 6.2A.2.2.1.4, 6.2A.2.2.2.3 and 6.2A.2.2.2.4 are applicable only when the Gap between the component carriers is ≤ to the aggregared bandwidth and when UE declares *intraBandFreqSeparationUL-v1620* value ≤ 200 MHz.

The definition of the gap is between the component carriers in a spectrum that is not part of any configured component carrier that is located in between the lowest edge of the component carrier with higher center frequency and the highest edge of the component carrier with center frequency that is located lower in frequency.

#### 6.2A.2.2.1 MPRIM3 to meet -30dBm/MHz

##### 6.2A.2.2.1.1 PC3 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MAWhere MA is defined as follows

MA = 15; 0 ≤ B < 1.08

 14.5; 1.08 ≤ B < 2.16

 13.5; 2.16 ≤ B < 3.24

12.5; 3.24 ≤ B < 5.04

11.5; 5.04≤ B < 10.08

 10.5; 10.08 ≤ B < 16.38

 10; 16.38 ≤ B < 21.78

 9; 21.78 ≤ B

Where:

B=(LCRB\_alloc, 1\* 12\* SCS1 + LCRB\_alloc,2 \* 12 \* SCS2)/1,000,000

##### 6.2A.2.2.1.2 PC2 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MAWhere MA is defined as follows

MA = 15.5; 0 ≤ B < 1.44

 15.0; 1.44 ≤ B < 2.88

14.0; 2.88 ≤ B < 5.76

12.0; 5.76 ≤ B < 10.8

 10.5; 10.8 ≤ B < 23.04

 9.0; 23.04 ≤ B

##### 6.2A.2.2.1.3 PC3 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MAWhere MA is defined as follows

MA = 17.5; 0 ≤ B < 1.08

 17.0; 1.08 ≤ B < 2.16

 16.5; 2.16 ≤ B < 3.24

16; 3.24 ≤ B < 5.04

15; 5.04≤ B < 10.08

 14.5; 10.08 ≤ B < 36

 10; 36 ≤ B < 56.88

 9; 56.88 ≤ B

##### 6.2A.2.2.1.4 PC2 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MAWhere MA is defined as follows

MA = 19.5; 0 ≤ B < 1.08

 19; 1.08 ≤ B < 2.16

 18; 2.16 ≤ B < 5.04

16.5; 5.04≤ B < 10.08

 16; 10.08 ≤ B < 36

 12; 36 ≤ B < 56.88

 10.5; 56.88 ≤ B

#### 6.2A.2.2.2 MPRIM3 to meet -13dBm/MHz

##### 6.2A.2.2.2.1 PC3 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MA

Where MA is defined as follows

MA = 9 ; 0 ≤ B < 0.54

 8 ; 0.54 ≤ B < 1.08

 7 ; 1.08 ≤ B < 2.16

 6.5 ; 2.16 ≤ B < 3.24

 5.5 ; 3.24 ≤ B < 5.4

 4 ; 5.4 ≤ B

Where:

B=(LCRB\_alloc, 1\* 12\* SCS1 + LCRB\_alloc,2 \* 12 \* SCS2)/1,000,000

##### 6.2A.2.2.2.2 PC2 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MA

Where MA is defined as follows

MA = 9 ; 0 ≤ B < 0.54

 8 ; 0.54 ≤ B < 1.08

 7 ; 1.08 ≤ B < 2.16

 6.5 ; 2.16 ≤ B < 3.24

 6 ; 3.24 ≤ B < 5.4

 5.5 ; 5.4 ≤ B ≤ 10.8

 4 ; 10.8 < B

##### 6.2A.2.2.2.3 PC3 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MAWhere MA is defined as follows

MA = 11; 0 ≤ B < 1.08

 10.5; 1.08 ≤ B < 2.16

10; 2.16 ≤ B < 3.24

9.5; 3.24≤ B < 5.04

 8.5; 5.04 ≤ B < 10.08

 7.5; 10.08 ≤ B < 36

 [7]; 36 ≤ B

##### 6.2A.2.2.2.4 PC2 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR=MAWhere MA is defined as follows

MA = 14; 0 ≤ B < 1.08

 12; 1.08 ≤ B < 2.16

 11.5; 2.16 ≤ B < 3.24

11; 3.24≤ B < 5.04

 9.5; 5.04 ≤ B < 10.08

 8.5; 10.08 ≤ B < 36

 6.5; 36 ≤ B

## **<End of Change>**