3GPP TSG-RAN WG4 Meeting # 111 *xxxx*

**Fukuoka City, Fukuoka, Japan, 20th May 2024 - 24th May 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **draft CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** | **-** | **rev** |  | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](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:*** | draft CR to TS 38.101-1 Rel-18 PC2 FDD intra-band CA REFSENS | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Skyworks Solutions, Inc., T-Mobile USA, Murata Manufacturing Corp., Qualcomm Inc. | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | HPUE\_NR\_FR1\_FDD\_R18 | | | | |  | | ***Date:*** | | 2024-05-23 |
|  |  | | | |  | | |  | |  |
| ***Category:*** | **F** |  | | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17)* *Rel-18 (Release 18)*  *Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | PC2 FDD REFSENS requirements need to be introduced and the MSD table format was agreed in WF R4-2406683. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Changes to core requirements:   * 7.3A.2.1: Added new text for PC2 applicability based on WF R4-2406683. * 7.3A.2.2: Added new text for PC2 applicability based on new text entry for clause 7.3A.2.1.   Changes to REFSENS Tables:   * Introduced new Table 7.3A.2.2-1a for PC2 intra-band non-contiguous CA reference sensitivity with one uplink carrier. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The PC2 requirements are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.3A.2.1, 7.3A.2.2. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | |  | | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | TS/TR ... CR ... | | | |
| ***affected:*** | | **X** |  | Test specifications | | | TS 38.521-1 | | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | TS/TR ... CR ... | | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |

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| ***This CR's revision history:*** |  |

## << Start of change >>

### 7.3A.2 Reference sensitivity power level for CA

#### 7.3A.2.1 Reference sensitivity power level for Intra-band contiguous CA

For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-2, and Table 7.3.2-3.

For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.2-3 and the downlink PCC carrier center frequency shall be configured closer to uplink operating band than any of the downlink SCC center frequency.

For aggregation of two or more downlink FDD carriers with two uplink carriers, the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.2.1-1 and the reference sensitivity power level increased by ΔRIBC. The requirements apply with all downlink carriers active. Unless given by Table 7.3.2-4, the reference sensitivity requirements shall be verified with the network signaling value NS\_01 (Table 6.2.3.1-1) configured.

**Table 7.3A.2.1-1: Intra-band contiguous CA uplink configuration for reference sensitivity**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS**  **(PCC/SCC)**  **(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **UL PCC allocation**  **(LCRB)** | **UL SCC allocation**  **(LCRB)** | **PCC ΔRIBC (dB)** | **SCC ΔRIBC (dB)** | **Duplex mode** |
| CA\_n5B | 15/15 | 10MHz + 10MHz | 10 (RBstart = 0) | 10 (RBstart = 42) | 30.8 | 26.1 | FDD |
| CA\_n5B5 | 15/15 | 5MHz + 20MHz | 4 (RBSTART = 0) | 16 (RBSTART = 90) | 44.6 | 23.0 | FDD |
| CA\_n7B | 15/15 | 10MHz + 40MHz | 9 (RBstart = 26) | 36 (RBstart = 180) | 34 | 25 | FDD |
| NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  NOTE 2: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.  NOTE 3: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2A.4.  NOTE 4: The PCC allocation is same as Transmission bandwidth configuration NRB as defined in Table 5.3.2-1.  NOTE 5: Applicable only to BCS 1. | | | | | | | |

For power class 2, the reference sensitivity power level is increased by ΔRIBC for specific uplink and downlink test points which are specified in Table 7.3A.2.1-3.

Table 7.3A.2.1-3: Power class 2 intra-band contiguous CA reference sensitivity with one uplink carrier.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS**  **(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **UL PCC allocation** | **SCC**  **ΔRIBNC1 (dB)** | **SCC**  **ΔRIBNC2 (dB)** | **Duplex mode** |
| CA\_n71B | 15/15 | 30 MHz + 5 MHz | 20 (RBstart = 0) | 5.6 **3** | 7.73 | FDD |
| NOTE 1: Applicable to UE supporting PC2 with single Tx.  NOTE 2: Applicable to UE supporting PC2 with dual Tx.  NOTE 3: Applicable only to BCS 4 and 5 and for UEs supporting the optional symmetrical UL/DL channel bandwidths. | | | | | | |

#### 7.3A.2.2 Reference sensitivity power level for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, throughput of each downlink component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) and parameters specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-2, and Table 7.3A.2.2-1 with the reference sensitivity power level increased by ΔRIBNC given in Table 7.3A.2.2-1 for the SCC(s).

For aggregation of two or more downlink FDD carriers with one uplink carrier the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.2.2-1. For power class 2, the reference sensitivity power level is increased by ΔRIBNC for specific uplink and downlink test points which are specified in Table 7.3A.2.2-1a. The requirements apply with all downlink carriers active. Unless given by Table 7.3.2-4, the reference sensitivity requirements shall be verified with the network signaling value NS\_01 (Table 6.2.3.1-1) configured.

**Table 7.3A.2.2-1: Intra-band non-contiguous CA with one uplink configuration for reference sensitivity in FDD bands.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS**  **(PCC/SCC)**  **(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **Wgap / [MHz]** | **UL PCC allocation**  **(LCRB)** | **ΔRIBNC (dB)** | **Duplex mode** |
| CA\_n1(2A) | 15/15 | 5MHz + 5MHz | 0.0 < Wgap ≤ 50.0 | 25 | 0.5 | FDD |
| CA\_n2(2A) | 15/15 | 5MHz + 5MHz | Wgap = 55.0 | 105 | 5.0 | FDD |
|  |  |  | Wgap = 30.0 | 25 | 0.0 |  |
| CA\_n3(2A) | 15/15 | 5MHz + 5MHz | Wgap = 65.0 | 125 | 4.7 | FDD |
|  |  |  | Wgap = 45.0 | 255 | 0.0 |  |
| CA\_n5(2A) | 15/15 | 15MHz + 5MHz | Wgap = 5.0 | 55 | 6.3 | FDD |
| CA\_n7(2A) | 15/15 | 10MHz + 5MHz | Wgap = 55 | 325 | 0.0 | FDD |
|  |  |  | Wgap = 30 | 505 | 0.0 |  |
| CA\_n12(2A) | 15/15 | 5MHz + 5MHz | 0.0 < Wgap ≤ 7.0 | 5(RBstart=12) | 3 | FDD |
| CA\_n25(2A) 9 | 15/15 | 5MHz + 5MHz | Wgap = 55.0 | 105 | 5.0 | FDD |
|  |  |  | Wgap = 30.0 | 25 | 0.0 |  |
| CA\_n25(2A) 10 CA\_n25(3A) | 15/15 | 40MHz + 5MHz | Wgap = 20.0 | 40 (RBstart = 176) | [24.6] 8 | FDD |
| CA\_n26(2A) | 15/15 | 15MHz + 10MHz | Wgap = 10.0 | 5 (RBstart = 74) | 25.2 | FDD |
| CA\_n66(2A)  CA\_n66(3A) | N/A | NOTE 1 | NOTE 2 | NOTE 3, NOTE 4 | 0.0 | FDD |
| CA\_n71(2A) | 15/15 | 5MHz + 5MHz | Wgap = 25.0 | 5 | 4.0 | FDD |
|  |  |  | Wgap = 5.0 | 20 | 0.0 |  |
|  |  | 10MHz + 5MHz | Wgap = 20.0 | 5 (RBstart = 9) | 4.6 |  |
|  |  |  | Wgap = 5.0 | 20 (RBstart = 9) | 2.3 |  |
|  |  | 15MHz + 10MHz | Wgap = 10.0 | 5 (RBstart = 2) | 22.2 |  |
|  |  |  | Wgap = 5.0 | 20 (RBstart = 19) | 5.2 |  |
| NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.2-1.  NOTE 2: All applicable sub-block gap sizes.  NOTE 3: The PCC allocation is same as Transmission bandwidth configuration NRB as defined in Table 5.3.2-1.  NOTE 4: The carrier center frequency of PCC in the DL operating band is configured closer to the UL operating band.  NOTE 5: Refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission.  NOTE 6: Wgap is the sub-block gap between the two sub-blocks.  NOTE 7: The carrier centre frequency of SCC in the DL operating band is configured closer to the UL operating band.  NOTE 8: For operation with three or more non-contiguous component carriers, ΔRIBNC applies to all secondary component carriers.  NOTE 9: Bandwidth Combination Set 0.  NOTE 10: Bandwidth Combination Set 1 | | | | | | |

Table 7.3A.2.2-1a: Power class 2 intra-band non-contiguous CA reference sensitivity with one uplink carrier.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS**  **(kHz)** | **Aggregated channel bandwidth (PCC+SCC)** | **Wgap / [MHz]** | **UL PCC allocation** | **SCC**  **ΔRIBNC1 (dB)** | **SCC**  **ΔRIBNC2 (dB)** | **Duplex mode** |
| CA\_n71(2A) | 15/15 | 15MHz + 10MHz | Wgap = 10.0 | 5 (RBstart = 2) | 24.8 | 29.3 | FDD |
|  |  | 25MHz + 5MHz1 | Wgap = 5.0 | 20 (RBstart = 8) | 27.23 | 31.83 |  |
| NOTE 1: Applicable to UE supporting PC2 with single Tx.  NOTE 2: Applicable to UE supporting PC2 with dual Tx.  NOTE 3: Applicable only to BCS 4 and 5 and for UEs supporting the optional symmetrical UL/DL channel bandwidths. | | | | | | | |

## << End of change >>