**3GPP TSG-RAN WG4 Meeting #109 R4-2320301**

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **1952** | **rev** | **-** | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** | big CR for addition of NR CA Intra-band FR1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CA\_R18\_intra | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***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 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:*** | | Inclusion of approved configurations at RAN4 109 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Addition of of:  R4-2321938, draftCR for addition of CA\_n102B and CA\_n102C uplink  R4-2321906, Draft CR to TS 38.101-1 (Rel-18): Add CA\_n5B BCS1 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Band configurations not included | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2A, 5.5A, 6.2F | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521 series | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

---Start of changes---

### 5.2A.1 Intra-band CA

NR intra-band carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.1-1 and Table 5.2A.1-2, where all operating bands are within FR1.

Table 5.2A.1-1: Intra-band contiguous CA operating bands in FR1

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1 | n1 |
| CA\_n2 | n2 |
| CA\_n3 | n3 |
| CA\_n5 | n5 |
| CA\_n7 | n7 |
| CA\_n25 | n25 |
| CA\_n38 | n38 |
| CA\_n40 | n40 |
| CA\_n41 | n41 |
| CA\_n46 | n46 |
| CA\_n48 | n48 |
| CA\_n66 | n66 |
| CA\_n71 | n71 |
| CA\_n77 | n77 |
| CA\_n78 | n78 |
| CA\_n79 | n79 |
| CA\_n96 | n96 |
| CA\_n102 | n102 |
| NOTE 1: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations. | |

Table 5.2A.1-2: Intra-band non-contiguous CA operating bands in FR1

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n1(\*) | n1 |
| CA\_n3(\*) | n3 |
| CA\_n5(\*) | n5 |
| CA\_n7(\*) | n7 |
| CA\_n12(\*) | n12 |
| CA\_n25(\*) | n25 |
| CA\_n26(\*) | n26 |
| CA\_n41(\*) | n41 |
| CA\_n48(\*) | n48 |
| CA\_n66(\*) | n66 |
| CA\_n71(\*) | n71 |
| CA\_n77(\*) | n77 |
| CA\_n78(\*) | n78 |
| CA\_n96(\*) | n96 |
| CA\_n102(\*) | n102 |
| NOTE 1: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations.  NOTE 2: The notation CA\_nX(\*) in this table indicates intra-band non-contiguous CA for band nX. The configurations for each band are in 5.5A.2. | |

---Text omitted---

### 5.5A.1 Configurations for intra-band contiguous CA

Table 5.5A.1-1: NR CA configurations and bandwidth combination sets defined for intra-band contiguous CA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration / Bandwidth combination set | | | | | | | | |
| NR CA configuration | Uplink CA configurations or single uplink carrier5 | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum aggregated  bandwidth (MHz) | Bandwidth combination set |
| CA\_n1B | - | 10 | 10,15 |  |  |  | 40 | 0 |
|  |  | 15 | 15,20 |  |  |  |  |  |
|  |  | 20 | 20 |  |  |  |  |  |
| CA\_n2B | - | 5 | 15 |  |  |  | 20 | 0 |
|  |  | 10 | 10 |  |  |  |  |  |
| CA\_n3B | - | 5 | 15, 20, 25, 30 |  |  |  | 60 | 0 |
|  |  | 10 | 10, 15, 20, 25, 30 |  |  |  |  |  |
|  |  | 15, 20, 25, 30 | 5, 10, 15, 20, 25, 30 |  |  |  |  |  |
|  |  | See n3 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 75 | 4 and 5 |
| CA\_n5B | CA\_n5B | 5, 10, 15 | 5, 10, 15 |  |  |  | 20 | 0 |
|  |  | 5, 10, 15, 20 | 5, 10, 15, 20 |  |  |  | 25 | 1 |
| CA\_n7B | CA\_n7B | 10 | 10, 15, 20, 30, 40 |  |  |  | 50 | 0 |
|  |  | 15 | 15, 20, 30 |  |  |  |  |  |
|  |  | 20 | 20, 30 |  |  |  |  |  |
|  | - | See n7 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 70 | 4 and 5 |
| CA\_n25B | - | 5 | 15 |  |  |  | 20 | 0 |
|  |  | 10 | 10 |  |  |  |  |  |
| CA\_n38B | - | 5 | 15, 20, 25 |  |  |  | 50 | 0 |
|  |  | 10 | 10, 15, 20, 25 |  |  |  |  |  |
|  |  | 15, 20, 25 | 5, 10, 15, 20, 25 |  |  |  |  |  |
| CA\_n40B | - | 20 | 80 |  |  |  | 100 | 0 |
|  |  | 50 | 50 |  |  |  |  |  |
|  | CA\_n40B | 10,15, 20, 30, 40, 50, 60, 80 | 10, 15, 20, 30, 40, 50, 60, 80 |  |  |  | 100 | 1 |
| CA\_n41B | n413  CA\_n41B | 10, 20, 30, 40, 50 | 10, 20, 30, 40, 50 |  |  |  | 100 | 0 |
|  |  | See n41 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n41C | n413,4  CA\_n41C3 | 40 | 80, 100 |  |  |  | 180 | 0 |
| 50, 60, 80 | 60, 80, 100 |  |  |  |  |  |
| 10 | 100 |  |  |  | 190 | 1 |
| 15, 20 | 90, 100 |  |  |  |  |  |
| 40 | 80, 90, 100 |  |  |  |  |  |
| 50, 60, 80, 90 | 60, 80, 90, 100 |  |  |  |  |  |
| 10 | 100 |  |  |  | 190 | 2 |
| 15, 20 | 90, 100 |  |  |  |  |  |
| 30, 40 | 80, 90, 100 |  |  |  |  |  |
| 50, 60, 80, 90 | 60, 80, 90, 100 |  |  |  |  |  |
|  |  | See n41 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 190 | 4 and 5 |
| CA\_n46B | - | 20, 40, 60 | 20, 40 |  |  |  | 100 | 0 |
| CA\_n46C | - | 60, 80 | 60, 80 |  |  |  | 160 | 0 |
| CA\_n46D | - | 60, 80 | 80 | 80 |  |  | 240 | 0 |
| CA\_n46M | - | 20, 40, 60 | 20, 40 | 20, 40 |  |  | 140 | 0 |
| CA\_n46N |  | Void |  |  |  |  |  | 0 |
|  |  | 20, 40, 60 | 20, 40 | 20, 40 | 20, 40 |  | 180 | 1 |
| CA\_n46O | - | 20, 60 | 20, 40 | 20, 40 | 20, 40 | 20, 40 | 220 | 0 |
| CA\_n48B | CA\_n48B | 5 | 15, 20 |  |  |  | 40 | 0 |
|  |  | 10, 15, 20 | 10, 15, 20 |  |  |  |  |  |
|  |  | 15, 20 | 15, 20 |  |  |  |  |  |
|  | - | 10 | 50, 60, 80, 90 |  |  |  | 100 | 1 |
|  |  | 15, 20 | 40, 50, 60, 80 |  |  |  |  |  |
|  |  | 40 | 40, 50, 60 |  |  |  |  |  |
|  | - | 10, 15, 20, 30, 40 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90 |  |  |  | 100 | 2 |
|  | - | See n48 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n48C | - | 10 | 100 |  |  |  | 140 | 0 |
|  |  | 15 | 90, 100 |  |  |  |  |  |
|  |  | 20 | 90, 100 |  |  |  |  |  |
|  |  | 40 | 80, 90, 100 |  |  |  |  |  |
|  | - | 10, 15, 20, 30, 40 | 70, 80, 90, 100 |  |  |  | 140 | 1 |
|  | - | See n48 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 140 | 4 and 5 |
| CA\_n66B | - | 5 1 | 20, 40 |  |  |  | 50 | 0 |
|  |  | 10 | 15, 20, 40 |  |  |  |  |  |
|  |  | 15 | 15, 20 |  |  |  |  |  |
| CA\_n71B | - | 5 | 20 |  |  |  | 25 | 0 |
|  |  | 10 | 15 |  |  |  |  |  |
|  |  | 10 | 20 |  |  |  | 35 | 1 |
|  |  | 15 | 15, 20 |  |  |  |  |  |
|  |  | 5, 10, 15 | 15, 20 |  |  |  | 35 | 2 |
|  |  | See n71 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 35 | 4 and 5 |
| CA\_n77B | n773 | 20 | 25, 30, 40 |  |  |  | 60 | 0 |
|  |  | 25 | 30 |  |  |  |  |  |
|  |  | See n77 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n77C | n773,4  CA\_n77C3 | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | 10 | 100 |  |  |  | 200 | 1 |
|  |  | 15, 20 | 90, 100 |  |  |  |  |  |
|  |  | 25, 30 | 80, 90, 100 |  |  |  |  |  |
|  |  | 40 | 70, 80, 90, 100 |  |  |  |  |  |
|  |  | 50, 60, 70, 80, 90, 100 | 60, 70, 80, 90, 100 |  |  |  |  |  |
|  |  | See n77 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |
| CA\_n77D | n773 | 100 | 100 | 100 |  |  | 300 | 0 |
|  |  | See n77 channel bandwidths in Table 5.3.5-1 for each carrier2 | | |  |  | 300 | 4 and 5 |
| CA\_n78B | n783 | 20 | 50 |  |  |  | 70 | 0 |
| CA\_n78C | n783  CA\_n78C3 | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | 10 | 100 |  |  |  | 200 | 1 |
|  |  | 15, 20 | 90, 100 |  |  |  |  |  |
|  |  | 25, 30 | 80, 90, 100 |  |  |  |  |  |
|  |  | 40 | 70, 80, 90, 100 |  |  |  |  |  |
|  |  | 50, 60, 70, 80, 90, 100 | 60, 70, 80, 90, 100 |  |  |  |  |  |
|  |  | See n78 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |
| CA\_n78D | n783 | 100 | 100 | 100 |  |  | 300 | 0 |
|  |  | See n78 channel bandwidths in Table 5.3.5-1 for each carrier2 | | |  |  | 300 | 4 and 5 |
| CA\_n79C | CA\_n79C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | See n79 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |
| CA\_n79D | - | 100 | 100 | 100 |  |  | 300 | 0 |
|  |  | See n79 channel bandwidths in Table 5.3.5-1 for each carrier2 | | |  |  | 300 | 4 and 5 |
| CA\_n96B | CA\_n96B | 20, 40 | 20, 40, 60, 80 |  |  |  | 100 | 0 |
| CA\_n96C | CA\_n96C | 80 | 40, 60, 80 |  |  |  | 160 | 0 |
| CA\_n96D |  | 80 | 80 | 60, 80 |  |  | 240 | 0 |
| CA\_n96E |  | 80 | 80 | 80 | 80 |  | 320 | 0 |
| CA\_n102B | CA\_n102B | 20, 40 | 20, 40, 60, 80 |  |  |  | 100 | 0 |
| CA\_n102C | CA\_n102C | 80 | 40, 60, 80 |  |  |  | 160 | 0 |
| CA\_n102D | - | 80 | 80 | 60, 80 |  |  | 240 | 0 |
| CA\_n102E | - | 80 | 80 | 80 | 80 |  | 320 | 0 |
| NOTE 1: 5 MHz is not applicable for 30/60 kHz SCS.  NOTE 2: The aggregated bandwidth must be greater than or equal to the minimum for the bandwidth class defined in Table 5.3A.5-1, and smaller than or equal to the maximum aggregated bandwidth.  NOTE 3: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 4: Minimum requirements for Power Class 1.5 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 5: Only single uplink carriers with power class other than PC3 are listed. | | | | | | | | |

---Text omitted---

#### 6.2F.1A.2 UE maximum output power for intra-band contiguous CA

For uplink intra-band contiguous carrier aggregation, the maximum output power is specified in Table 6.2F.1A.2-1. For downlink intra-band contiguous carrier aggregation with a single uplink component carrier configured in the NR-U band, the maximum output power is specified in Table 6.2F.1-1 for power class 5.

Table 6.2F.1A.2-1: UE Power Class for intra-band contiguous CA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Configuration | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
| CA\_n96B |  |  |  |  |  |  | 20 | +2/-3 |
| CA\_n96C |  |  |  |  |  |  | 20 | +2/-3 |
| CA\_n102B |  |  |  |  |  |  | 20 | +2/-3 |
| CA\_n102C |  |  |  |  |  |  | 20 | +2/-3 |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the tolerance.  NOTE 2: Power class 5 is default power class unless otherwise stated. | | | | | | | | |

---Text omitted---

### 6.2F.3A UE additional maximum output power reduction for CA

#### 6.2F.3A.1 UE additional maximum output power reduction for inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the requirements in clause 6.2.3 apply for the NR uplink carrier and clause 6.2F.3 for the carrier operating with shared spectrum access.

#### 6.2F.3A.2 UE additional maximum output power reduction for intra-band CA

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2F.1A.2-1. Unless stated otherwise, the total reduction to UE maximum output power is max(MPR, A-MPR) where MPR is defined in clause 6.2F.2A.2 for intra-band carrier aggregation.

---Text omitted---

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. | | | | | | | |

---End of changes---