**3GPP TSG-RAN WG4 Meeting #97-e *R4-2016798***

**, –**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE Corporation | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_unlic-Core | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | |  |
|  | *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:*** | | The NR bandwidth classes in Table 5.3A.5-1 have been extended with fallback group 3 (FBG 3) for shared spectrum operating bands in RP-202117. However, for the lower limits of NR CA bandwidth classes “M”, 50MHz should cover one 10MHz channel bandwidth (10 + 20 + 20 MHz to cover 50 MHz allocation). And for class “N”, the lower limit 80MHz should be set for supporting (4cc x 20MHz) CA combinations. As for the upper limits of the aggregated channel bandwidth for classes “M”, “N” and “O”, the definition of these CA BW classes have not been finalized as their aggregated channel BW upper limits are still left in square brackets. In order to achieve full coverage of all possible NR-U channel BW combinations, the upper limits are proposed as 200MHz, 300MHz and 400MHz respectively.  Furthermore, considering that the aggregated channel BW ranges of classes “G”, “H”, and “I” are covered by those of classes “M”, “N” and “O”, the NR-U intra-band contiguous configurations CA\_n46G, CA\_n46H, and CA\_n46I should be merged into CA\_n46M, CA\_n46N, and CA\_n46O respectively. Accordingly, the NR-U intra-band contiguous CA Rx requirements for BW class “I” are no longer needed as it can be covered by class “O”. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Change the sign “<” to “≤” in the lower limits of aggregated channel bandwidth for NR CA BW classes “M” and “N”. 2. Change the upper limits of classes “M”, “N” and “O” to 200MHz, 300MHz and 400MHz respectively. 3. Merge NR-U CA configurations CA\_n46G, CA\_n46H, and CA\_n46I into CA\_n46M, n46N, and n46O respectively. 4. Remove the NR-U intra-band contiguous CA Rx requirements for BW class “I”. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | 1. The NR CA BW class for NR-U will not achieve full coverage of all possible NR-U channel BW combinations. 2. NR-U intra-band contiguous CA combinations will be split into two fallback groups. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.3A.5, 5.5A.1, 7.5F.2, 7.6F.2.2, 7.6F.3.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS/TR ... CR ... 38.521-1 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

### *<< start of changes >>*

### *<< Unchanged sections omitted >>*

### 5.3A.5 UE channel bandwidth per operating band for CA

The requirements for carrier aggregation in this specification are defined for carrier aggregation configurations.

For intra-band contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting a carrier aggregation bandwidth class with associated bandwidth combination sets specified in clause 5.5A.1. For each carrier aggregation configuration, requirements are specified for all aggregated channel bandwidths contained in a bandwidth combination set, a UE can indicate support of several bandwidth combination sets per carrier aggregation configuration. For intra-band non-contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting two or more sub-blocks, each supporting a carrier aggregation bandwidth class.

For inter-band carrier aggregation, a carrier aggregation configuration is a combination of operating bands, each supporting a carrier aggregation bandwidth class.

Table 5.3A.5-1: NR CA bandwidth classes

|  |  |  |  |
| --- | --- | --- | --- |
| NR CA bandwidth class | Aggregated channel bandwidth | Number of contiguous CC | Fallback group |
| A | BWChannel ≤ BWChannel,max | 1 | 1, 2, 3 |
| B | 20 MHz ≤ BWChannel\_CA ≤ 100 MHz | 2 | 2, 3 |
| C | 100 MHz < BWChannel\_CA ≤ 2 x BWChannel,max | 2 | 1, 3 |
| D | 200 MHz < BWChannel\_CA ≤ 3 x BWChannel,max | 3 |
| E | 300 MHz < BWChannel\_CA ≤ 4 x BWChannel,max | 4 |
| G | 100 MHz < BWChannel\_CA ≤ 150 MHz | 3 | 2 |
| H | 150 MHz < BWChannel\_CA ≤ 200 MHz | 4 |
| I | 200 MHz < BWChannel\_CA ≤ 250 MHz | 5 |
| J | 250 MHz < BWChannel\_CA ≤ 300 MHz | 6 |
| K | 300 MHz < BWChannel\_CA ≤ 350 MHz | 7 |
| L | 350 MHz < BWChannel\_CA ≤ 400 MHz | 8 |
| M3 | 50 MHz ≤ BWChannel\_CA ≤ 200 MHz | 3 | 3 |
| N3 | 80 MHz ≤ BWChannel\_CA ≤ 300 MHz | 4 |
| O3 | 100 MHz ≤ BWChannel\_CA ≤ 400 MHz | 5 |
| NOTE 1: BWChannel, max is maximum channel bandwidth supported among all bands in a release  NOTE 2: It is mandatory for a UE to be able to fallback to lower order NR CA bandwidth class configuration within a fallback group. It is not mandatory for a UE to be able to fallback to lower order NR CA bandwidth class configuration that belong to a different fallback group.  NOTE 3: This bandwidth class is only applicable to bands identified for use with shared spectrum channel access in Table 5.2-1. | | | |

### *<< Unchanged sections omitted >>*

## 5.5A Configurations for CA

### 5.5A.0 General

The configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41 but with otherwise identical parameters. For brevity the said configuration for CA operating bands with Band n90 are not listed in the tables below but are covered by this specification.

Non‑contiguous resource allocation and almost contiguous allocation are not applicable for each NR carrier of intra‑band contiguous and non-contiguous CA configurations.

### 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 | 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\_n7B | CA\_n7B | 10, 15, 20 | 10, 15, 20, 30, 35, 40 |  |  |  | 50 | 0 |
| CA\_n40B | - | 20 | 80 |  |  |  | 100 | 0 |
| 50 | 50 |  |  |  |
| CA\_n41B | CA\_n41B | 10, 20, 30, 40, 50 | 10, 20, 30, 40, 50 |  |  |  | 100 | 0 |
| CA\_n41C | CA\_n41C | 40 | 80, 100 |  |  |  | 180 | 0 |
| 50, 60, 80 | 60, 80, 100 |  |  |  |
| 10, 15, 20, 40, 50, 60, 80, 90 | 15, 20, 40, 50, 60, 80, 90, 100 |  |  |  | 190 | 1 |
| 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\_n46E | - | 80 | 80 | 80 | 80 |  | 320 | 0 |
| CA\_n46M | - | 20, 40, 60 | 20, 40 | 20, 40 |  |  | 140 | 0 |
| CA\_n46N | - | 20, 40, 80 | 20, 40 | 20, 40 | 20, 40 |  | 200 | 0 |
| CA\_n46O | - | 20, 60 | 20, 40 | 20, 40 | 20, 40 | 20, 40 | 220 | 0 |
| CA\_n48B | CA\_n48B | 5, 10 | 10, 15, 20 |  |  |  | 40 | 0 |
| 15, 20 | 5, 10, 15, 20 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| - | 10 | 50, 60, 80, 90 |  |  |  | 100 | 1 |
| 15, 20 | 40, 50, 60, 80 |  |  |  |
| 40 | 40, 50, 60 |  |  |  |
|  |  |  |  |  |
| CA\_n48C | - | 10 | 100 |  |  |  | 140 | 0 |
| 15 | 90,100 |  |  |  |
| 20 | 90, 100 |  |  |  |
| 40 | 80, 90, 100 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| CA\_n66B | - | 5 1 | 20, 40 |  |  |  | 50 | 0 |
| 10 | 15, 20, 40 |  |  |  |
| 15 | 10, 15, 20 |  |  |  |
| 20 | 5 1, 10, 15 |  |  |  |
| 40 | 5 1, 10 |  |  |  |
| CA\_n71B | - | 5 | 20 |  |  |  | 25 | 0 |
| 10 | 15 |  |  |  |
| 15 | 10 |  |  |  |
| 20 | 5 |  |  |  |
| 10 | 20 |  |  |  | 35 | 1 |
| 15 | 15, 20 |  |  |  |
| 20 | 10, 15 |  |  |  |
| CA\_n77C | CA\_n77C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
| 60 | 60, 80, 100 |  |  |  |
| 80 | 80, 100 |  |  |  |
| 100 | 100 |  |  |  |
| 10, 15, 20, 25, 30, 40, 50, 60, 70,80,90, 100 | 10, 15, 20, 25, 30, 40, 50, 60, 70,80,90, 100 |  |  |  | 200 | 1 |
| CA\_n77D | - | 100 | 100 | 100 |  |  | 300 | 0 |
| CA\_n78B | - | 20 | 50 |  |  |  | 70 | 0 |
| CA\_n78C | CA\_n78C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
| 60 | 60, 80, 100 |  |  |  |
| 80 | 80, 100 |  |  |  |
| 100 | 100 |  |  |  |
| 10, 15, 20, 25, 30, 40, 50, 60, 70,80,90, 100 | 10, 15, 20, 25, 30, 40, 50, 60, 70,80,90, 100 |  |  |  | 200 | 1 |
| CA\_n78D | - | 100 | 100 | 100 |  |  | 300 | 0 |
| CA\_n79C | CA\_n79C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
| 60 | 60, 80, 100 |  |  |  |
| 80 | 80, 100 |  |  |  |
| 100 | 100 |  |  |  |
| CA\_n79D | - | 100 | 100 | 100 |  |  | 300 | 0 |
| NOTE 1: 5 MHz is not applicable for 30/60 kHz SCS. | | | | | | | | |

### *<< Unchanged sections omitted >>*

### **7.5F.2 Intra-band contiguous shared spectrum channel access CA**

ACS for intra-band contiguous shared access CA requirements are specified in Table 7.5F.2-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.5F.2-2, the throughput of each carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, 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).

Table 7.5F.2-1: ACS for intra-band contiguous shared access CA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | NR-U CA bandwidth class | | | | | | | |
| Rx Parameter | Units | B | C | D | E | M | N | O |  |
| ACS | dB | [24] – 10log10(BWChannel\_CA/20) | | | | | | | |

Table 7.5F.1-2: Test parameters for intra-band contiguous NR-U CA

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | NR-U CA bandwidth class |
| B, C, D, E, M, N, O |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | REFSENS + 14 dB |
| PInterferer | dBm | Aggregated power + [24] – 1.5 – 10log10(BWChannel\_CA/20) dB |
| BWInterferer | MHz | 20 |
| FInterferer (offset) | MHz | 10 + Foffset  /  -10 - Foffset |
| NOTE 1: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4 .  NOTE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to C:\Users\10011873\AppData\Local\Temp\ksohtml33364\wps1.pngMHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.  NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 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. | | |

### *<< Unchanged sections omitted >>*

#### **7.6F.2.2 Intra-band contiguous shared spectrum channel access CA**

In-band blocking for intra-band contiguous shared access CA requirements are specified in Table 7.6F.2.2-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.6F.2.2-2, the throughput of each carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, 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).

Table 7.6F.2.2-1: In-band blocking parameters for intra-band contiguous shared access CA

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | Shared access CA bandwidth class |
| B, C, D, E, M, N, O |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | REFSENS + aggregated channel bandwidth value below |
| dB | 9 + 10log(BWChannel\_CA/20) |
| BWInterferer | MHz | 20 |
| FIoffset, case 1 | MHz | 30 |
| FIoffset, case 2 | MHz | ≥ 50 |
| NOTE 1: The transmitter shall be set to 4dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4.  NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1 | | |

Table 7.6F.2.2-2: In-band blocking for intra-band contiguous shared access CA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band | Parameter | Unit | Case 1 | Case 2 |
| Pinterferer | dBm | -56 | -44 |
| Finterferer (offset) | MHz | -BWchannel CA/2 –FIoffset, case 1  and  BWchannel CA/2 +FIoffset, case 1 | ≤ -BWchannel CA/2 –FIoffset, case 2  and  ≥ BWchannel CA/2 +FIoffset, case 2 |
| n46 | Finterferer | MHz | NOTE 2 | FDL\_low – 3\* BWchannel CA  to  FDL\_high + 3\* BWchannel CA  NOTE 4 |
| NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to C:\Users\10011873\AppData\Local\Temp\ksohtml33364\wps2.pngMHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.  NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWchannel CA/2 – FIoffset, case 1; b: BWchannel CA/2 + FIoffset, case 1  NOTE 3: BWchannel CA denotes the aggregated channel bandwidth of the wanted signal  NOTE 4: Interferer carrier frequencies in the frequency range for Case 2 shall be located at discrete frequencies in integer multiples of 20 MHz offset from - BWchannel CA /2 – FIoffset, case 2 and BWchannel CA /2 + FIoffset, case 2 | | | | |

### *<< Unchanged sections omitted >>*

#### **7.6F.3.2 Intra-band contiguous shared spectrum channel access CA**

Out-of-band blocking for intra-band contiguous shared access CA requirements are specified in Table 7.6F.3.2-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.6F.3.2-2, the throughput of each carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, 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).

Table 7.6F.3.2-1: Out-of-band blocking parameters for intra-band contiguous shared access CA

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | Shared access CA bandwidth class |
| B, C, D, E, M, N,O |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | REFSENS + CA bandwidth class specific value below |
| dB | 9 |
| NOTE 1: The transmitter shall be set to 4dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4. | | |

Table 7.6F.3.2-2: Out of-band blocking for intra-band contiguous CA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operating band | Parameter | Unit | Range1 | Range 2 | Range 3 |
| Pinterferer | dBm | -45 | -30 | -15 |
| n46 | Finterferer (CW) | MHz | N/A | -200 < f – FDL\_low ≤ -3\*BWChannel\_CA  or  3\*BWChannel\_CA ≤ f – FDL\_high < 200 | 1 ≤ f ≤ FDL\_low – MAX(200,3\*BWChannel\_CA)  or  FDL\_high + MAX(200,3\*BWChannel\_CA)  ≤ f ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 4200 MHz. | | | | | |

==============================================================

### *<< End of changes >>*