**3GPP TSG-RAN WG4 Meeting #116 R4-2509569**

**Bengaluru, IN, August 25 – 29, 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-1** | **CR** | **2898** | **rev** | **1** | **Current version:** | **19.2.0** |  |
|  |
| *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 |  |

|  |
| --- |
|  |
| ***Title:***  | (NR\_LBCA\_Sw-Core) Introducing low NR band aggregation via switching to TS38.101-1 |
|  |  |
| ***Source to WG:*** | Apple, Telus |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_LBCA\_Sw-Core |  | ***Date:*** | 2025-08-25 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | The applicable low band CA configuration for the example band combination, the time mask requirements, and MSD applicability are defined in this CR to introduce the feature to the RF specification. |
|  |  |
| ***Summary of change:*** | * Change 1: clarify the applicability of simultaneous Rx/Tx requirements to band combinations which are supported via switching in Clause 5.2A.2
* Change 2: introduce the indication of support via switching for the example band combination (CA\_n5A-n29A) in Clause 5.5A.3.1
* Change 3: define the applicability of the ON/OFF time mask for carrier aggregation via switching in Clause 6.3A.3.3.1
* Change 4: define the ON/OFF time mask for the UL transmissions in the new Clause 6.3A.3.3.7.
* Change 5: provide a reference for the RMCs applicable to REFSENS testing of devices which support low band aggregation via switching
* Change 6: define the SCS15 FDD and SDL RMCs applicable to REFSENS testing of devices which support low band aggregation via switching
 |
|  |  |
| ***Consequences if not approved:*** | RF requirements for the feature low NR band carrier aggregation via switching will not be specified. |
|  |  |
| ***Clauses affected:*** | 5.2A.2, 5.2A.2.1, 5.5A.3.0, 5.5A.3.1, 6.3A.3.3.1, 6.3A.3.7(new), 7.3A.2.3, A.3.2.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** | **X** |  |  Test specifications | TS38.521-1 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |   |
|  |  |
| ***Other comments:*** | Refer to TR38.768 for the technical background |
|  |  |
| ***This CR's revision history:*** |  |

<< begin change 1 >>

### 5.2A.2 Inter-band CA

NR inter-band carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.2.1-1, Table 5.2A.2.2-1, Table 5.2A.2.3-1, Table 5.2A.2.4-1 and Table 5.2A.2.5-1, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a lower order band combination, when the applicable lower order band combination is a band pair in a higher order band combination, the mandatory simultaneous Rx/Tx capability also applies for the band pair in the higher order band combination.

Unless stated otherwise, simultaneous Rx/Tx capability is mandatory for FR1+FR1 FDD-TDD and TDD-SDL CA combinations. Simultaneous Rx/Tx capability is mandatory without signaling for FR1+FR1 FDD-FDD and FDD-SDL CA combinations. For low NR band inter-band configurations supported via switching [*supportedLowBandSwitching-r19*], the simultaneous Rx/Tx capability does not apply.

Table 5.2A.2-1: Void

Table 5.2A.2-2: Void

Table 5.2A.2-3: Void

#### 5.2A.2.1 Inter-band CA (two bands)

Table 5.2A.2.1-1: Inter-band CA operating bands involving FR1 (two bands)

| NR CA Band | NR Band(Table 5.2-1) | DL interruption allowed (Note 8) |
| --- | --- | --- |
| CA\_n1-n3 | n1, n3 |  |
| CA\_n1-n5 | n1, n5 |  |
| CA\_n1-n7 | n1, n7 |  |
| CA\_n1-n8 | n1, n8 |  |
| CA\_n1-n18 | n1, n18 |  |
| CA\_n1-n20 | n1, n20 |  |
| CA\_n1-n26 | n1, n26 |  |
| CA\_n1-n28 | n1, n28 |  |
| CA\_n1-n38 | n1, n38 |  |
| CA\_n1-n40 | n1, n40 |  |
| CA\_n1-n41 | n1, n41 |  |
| CA\_n1-n46 | n1, n46 |  |
| CA\_n1-n67 | n1, n67 |  |
| CA\_n1-n71 | n1, n71 |  |
| CA\_n1-n74 | n1, n74 |  |
| CA\_n1-n75 | n1, n75 |  |
| CA\_n1-n77 | n1, n77 | No |
| CA\_n1-n78 | n1, n78 | No |
| CA\_n1-n79 | n1, n79 | No |
| CA\_n1-n102 | n1, n102 |  |
| CA\_n1-n105 | n1, n105 |  |
| CA\_n2-n5 | n2, n5 |  |
| CA\_n2-n7 | n2, n7 |  |
| CA\_n2-n12 | n2, n12 |  |
| CA\_n2-n14 | n2, n14 |  |
| CA\_n2-n29 | n2, n29 |  |
| CA\_n2-n30 | n2, n30 |  |
| CA\_n2-n41 | n2, n41 |  |
| CA\_n2-n48 | n2, n48 |  |
| CA\_n2-n66 | n2, n66 |  |
| CA\_n2-n71 | n2, n71 |  |
| CA\_n2-n77 | n2, n77 |  |
| CA\_n2-n78 | n2, n78 |  |
| CA\_n3-n5 | n3, n5 |  |
| CA\_n3-n7 | n3, n7 |  |
| CA\_n3-n8 | n3, n8 |  |
| CA\_n3-n18 | n3, n18 |  |
| CA\_n3-n20 | n3, n20 |  |
| CA\_n3-n26 | n3, n26 |  |
| CA\_n3-n28 | n3, n28 |  |
| CA\_n3-n34 | n3, n34 |  |
| CA\_n3-n38 | n3, n38 |  |
| CA\_n3-n39 | n3, n39 |  |
| CA\_n3-n40 | n3, n40 | No |
| CA\_n3-n41 | n3, n41 | No |
| CA\_n3-n67 | n3, n67 |  |
| CA\_n3-n74 | n3, n74 |  |
| CA\_n3-n75 | n3, n75 |  |
| CA\_n3-n77 | n3, n77 |  |
| CA\_n3-n78 | n3, n78 | No |
| CA\_n3-n79 | n3, n79 | No |
| CA\_n3-n34 | n3, n34 | No |
| CA\_n3-n102 | n3, n102 |  |
| CA\_n3-n104 | n3, n104 |  |
| CA\_n3-n105 | n3, n105 |  |
| CA\_n5-n7 | n5, n7 |  |
| CA\_n5-n8 | n5, n8 |  |
| CA\_n5-n12 | n5, n12 |  |
| CA\_n5-n13 | n5, n13 |  |
| CA\_n5-n14 | n5, n14 |  |
| CA\_n5-n25 | n5, n25 |  |
| CA\_n5-n28 | n5, n28 |  |
| CA\_n5-n2921 | n5, n29 |  |
| CA\_n5-n30 | n5, n30 |  |
| CA\_n5-n40 | n5, n40 |  |
| CA\_n5-n41 | n5, n41 |  |
| CA\_n5-n48 | n5, n48 |  |
| CA\_n5-n66 | n5, n66 |  |
| CA\_n5-n71 | n5, n71 |  |
| CA\_n5-n77 | n5, n77 |  |
| CA\_n5-n78 | n5, n78 | No |
| CA\_n5-n79 | n5, n79 | No |
| CA\_n5-n105 | n5, n105 |  |
| CA\_n7-n8 | n7, n8 |  |
| CA\_n7-n12 | n7, n12 |  |
| CA\_n7-n20 | n7, n20 |  |
| CA\_n7-n25 | n7, n25 |  |
| CA\_n7-n26 | n7, n26 |  |
| CA\_n7-n28 | n7, n28 |  |
| CA\_n7-n29 | n7, n29 |  |
| CA\_n7-n40 | n7, n40 |  |
| CA\_n7-n466 | n7, n46 |  |
| CA\_n7-n66 | n7, n66 |  |
| CA\_n7-n67 | n7, n67 |  |
| CA\_n7-n71 | n7, n71 |  |
| CA\_n7-n75 | n7, n75 |  |
| CA\_n7-n77 | n7, n77 |  |
| CA\_n7-n78 | n7, n78 |  |
| CA\_n7-n79 | n7, n79 |  |
| CA\_n7-n102 | n7, n102 |  |
| CA\_n7-n105 | n7, n105 |  |
| CA\_n8-n20 | n8, n20 |  |
| CA\_n8-n28 | n8, n28 |  |
| CA\_n8-n34 | n8, n34 |  |
| CA\_n8-n38 | n8, n38 |  |
| CA\_n8-n39 | n8, n39 |  |
| CA\_n8-n40 | n8, n40 |  |
| CA\_n8-n41 | n8, n41 | No |
| CA\_n8-n751 | n8, n75 |  |
| CA\_n8-n77 | n8, n77 |  |
| CA\_n8-n78 | n8, n78 | No |
| CA\_n8-n79 | n8, n79 | No |
| CA\_n8-n104 | n8, n104 |  |
| CA\_n12-n25 | n12, n25 |  |
| CA\_n12-n30 | n12, n30 |  |
| CA\_n12-n41 | n12, n41 |  |
| CA\_n12-n48 | n12, n48 |  |
| CA\_n12-n66 | n12, n66 |  |
| CA\_n12-n71 | n12, n71 |  |
| CA\_n12-n77 | n12, n77 |  |
| CA\_n12-n78 | n12, n78 |  |
| CA\_n13-n25 | n13, n25 |  |
| CA\_n13-n66 | n13, n66 |  |
| CA\_n13-n77 | n13, n77 |  |
| CA\_n14-n30 | n14, n30 |  |
| CA\_n14-n66 | n14, n66 |  |
| CA\_n14-n77 | n14, n77 |  |
| CA\_n18-n28 | n18, n28 |  |
| CA\_n18-n40 | n18, n40 |  |
| CA\_n18-n41 | n18, n41 |  |
| CA\_n18-n74 | n18, n74 |  |
| CA\_n18-n7710 | n18, n77 |  |
| CA\_n18-n7811 | n18, n78 |  |
| CA\_n20-n282 | n20, n28 |  |
| CA\_n20-n40 | n20, n40 |  |
| CA\_n20-n41 | n20, n41 |  |
| CA\_n20-n67 | n20, n67 |  |
| CA\_n20-n71 | n20, n71 |  |
| CA\_n20-n75 | n20, n75 |  |
| CA\_n20-n77 | n20, n77 |  |
| CA\_n20-n78 | n20, n78 |  |
| CA\_n24-n41 | n24, n41 |  |
| CA\_n24-n48 | n24, n48 |  |
| CA\_n24-n77 | n24, n77 |  |
| CA\_n25-n29 | n25, n29 |  |
| CA\_n25-n38 | n25, n38 |  |
| CA\_n25-n41 | n25, n41 |  |
| CA\_n25-n466 | n25, n46 |  |
| CA\_n25-n48 | n25, n48 |  |
| CA\_n25-n66 | n25, n66 |  |
| CA\_n25-n71 | n25, n71 |  |
| CA\_n25-n77 | n25, n77 |  |
| CA\_n25-n78 | n25, n78 |  |
| CA\_n25-n85 | n25, n85 |  |
| CA\_n26-n28 | n26, n28 |  |
| CA\_n26-n29 | n26, n29 |  |
| CA\_n26-n48 | n26, n48 |  |
| CA\_n26-n66 | n26, n66 |  |
| CA\_n26-n70 | n26, n70 |  |
| CA\_n26-n71 | n26, n71 |  |
| CA\_n26-n77 | n26, n77 |  |
| CA\_n26-n78 | n26, n78 |  |
| CA\_n28-n34 | n28, n34 |  |
| CA\_n28-n38 | n28, n38 |  |
| CA\_n28-n39 | n28, n39 |  |
| CA\_n28-n40 | n28, n40 |  |
| CA\_n28-n41 | n28, n41 |  |
| CA\_n28-n466 | n28, n46 |  |
| CA\_n28-n50 | n28, n50 |  |
| CA\_n28-n7112 | n28, n71 |  |
| CA\_n28-n74 | n28, n74 |  |
| CA\_n28-n752 | n28, n75 |  |
| CA\_n28-n77 | n28, n77 | No |
| CA\_n28-n78 | n28, n78 | No |
| CA\_n28-n79 | n28, n79 |  |
| CA\_n28-n94 | n28, n94 |  |
| CA\_n28-n102 | n28, n102 |  |
| CA\_n28-n105 | n28, n105 |  |
| CA\_n29-n30 | n29, n30 |  |
| CA\_n29-n48 | n29, n48 |  |
| CA\_n29-n66 | n29, n66 |  |
| CA\_n29-n70 | n29, n70 |  |
| CA\_n29-n71 | n29, n71 |  |
| CA\_n29-n77 | n29, n77 |  |
| CA\_n30-n66 | n30, n66 |  |
| CA\_n30-n77 | n30, n77 |  |
| CA\_n34-n399 | n34, n39 |  |
| CA\_n34-n40 | n34, n40 |  |
| CA\_n34-n41 | n34, n41 |  |
| CA\_n34-n791 | n34, n79 |  |
| CA\_n38-n409 | n38, n40 |  |
| CA\_n38-n66 | n38, n66 |  |
| CA\_n38-n71 | n38, n71 |  |
| CA\_n38-n781 | n38, n78 |  |
| CA\_n38-n791 | n38, n79 |  |
| CA\_n39-n40 | n39, n40 |  |
| CA\_n39-n41 | n39, n41 | No |
| CA\_n39-n791 | n39, n79 | No |
| CA\_n40-n41 | n40, n41 |  |
| CA\_n40-n771 | n40, n77 |  |
| CA\_n40-n781 | n40, n78 |  |
| CA\_n40-n791,4 | n40, n79 | No |
| CA\_n40-n105 | n40, n105 |  |
| CA\_n41-n481 | n41, n48 |  |
| CA\_n41-n501 | n41, n50 |  |
| CA\_n41-n66 | n41, n66 |  |
| CA\_n41-n70 | n41, n70 |  |
| CA\_n41-n71 | n41, n71 |  |
| CA\_n41-n74 | n41, n74 |  |
| CA\_n41-n771 | n41, n77 |  |
| CA\_n41-n781 | n41, n78 |  |
| CA\_n41-n791,3 | n41, n79 | No |
| CA\_n41-n85 | n41, n85 |  |
| CA\_n41-n104 | n41, n104 |  |
| CA\_n46-n481,6 | n46, n48 |  |
| CA\_n46-n666 | n46, n66 |  |
| CA\_n46-n771,6 | n46, n77 |  |
| CA\_n46-n781,6 | n46, n78 |  |
| CA\_n46-n969,16,17,18 | n46, n96 |  |
| CA\_n46-n1029,16,18,20 | n46, n102 |  |
| CA\_n48-n539 | n48, n53 |  |
| CA\_n48-n66 | n48, n66 |  |
| CA\_n48-n70 | n48, n70 |  |
| CA\_n48-n71 | n48, n71 |  |
| CA\_n48-n779,14,18 | n48, n77 |  |
| CA\_n48-n961, 6 | n48, n96 |  |
| CA\_n50-n78 | n50, n78 |  |
| CA\_n66-n70 | n66, n70 |  |
| CA\_n66-n71 | n66, n71 |  |
| CA\_n66-n77 | n66, n77 |  |
| CA\_n66-n78 | n66, n78 |  |
| CA\_n66-n85 | n66, n85 |  |
| CA\_n67-n78 | n67, n78 |  |
| CA\_n70-n71 | n70, n71 |  |
| CA\_n70-n77 | n70, n77 |  |
| CA\_n70-n78 | n70, n78 |  |
| CA\_n71-n77 | n71, n77 |  |
| CA\_n71-n78 | n71, n78 |  |
| CA\_n71-n85 | n71, n85 |  |
| CA\_n74-n77 | n74, n77 |  |
| CA\_n74-n78 | n74, n78 |  |
| CA\_n75-n781 | n75, n78 |  |
| CA\_n76-n781 | n76, n78 |  |
| CA\_n77-n789 | n77, n78 |  |
| CA\_n77-n795 | n77, n79 |  |
| CA\_n77-n85 | n77, n85 |  |
| CA\_n77-n102 | n77, n102 |  |
| CA\_n78-n795 | n78, n79 |  |
| CA\_n78-n92 | n78, n92 |  |
| CA\_n78-n94 | n78, n94 |  |
| CA\_n78-n102 | n78, n102 |  |
| CA\_n78-n104 | n78, n104 |  |
| CA\_n78-n105 | n78, n105 |  |
| CA\_n100-n101 | n100, n101 |  |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability.NOTE 2: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.NOTE 3: The frequency range below 2506 MHz for Band n41 is not used in this combination.NOTE 4: Applicable for frequency range above 4800 MHz for Band n79 in this combination.NOTE 5: For UEs supporting band n77, the minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n78-n79 or n77-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration.NOTE 6: The PCell is allocated in the licensed band in this combination.NOTE 7: Void.NOTE 8: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13].NOTE 9: Only applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx. Same restrictions are applied when applicable NR CA configuration is part of a higher order configurations.NOTE 10 The frequency range in band n77 is restricted for this band combination to 3520-3560 MHz, 3700-3800 MHz, 4000-4100 MHz.NOTE 11: The frequency range in band n78 is restricted for this band combination to 3520 -3560 MHz and 3700– 3800 MHz.NOTE 12: The implementation with 4 antennas is targeted for FWA form factor for this band combination.NOTE 13: VoidNOTE 14: The band n48 and n77 will synchronize their uplink and downlink configurations and in commonly TDD network coordinationNOTE 15: VoidNOTE 16: The minimum requirements for intra-band non-contiguous CA/DC apply for CA\_n46-n96 or CA\_n46-n102 and related higher order CA/DC configurations.NOTE 17: The combination is not used alone as fall back mode of other band combinations in which UL in Band 48 is not used.NOTE 18: The minimum requirements for inter-band CA apply when the maximum power spectral density imbalance between downlink carriers is within 6 dB. The power spectral density imbalance condition also applies for these carriers when applicable CA configuration is a subset of a higher order CA configuration.NOTE 19: VoidNOTE 20: The combination is not used alone as fall back mode of other band combinations in which UL in Band n78 is not used.NOTE 21: Concurrent operation between these bands is not applicable to UEs indicating support of low NR band aggregation via switching [*supportedLowBandSwitching-r19*] for this band combination |

<< end change 1 >>

<< begin change 2 >>

### 5.5A.3 Configurations for inter-band CA

Table 5.5A.3-1: Void

Table 5.5A.3-2: Void

Table 5.5A.3-3: Void

#### 5.5A.3.0 General

For the NR inter-band CA configurations in sub-clause 5.5A.3, when the capability *supportedBandPairListNR-r18* is present, three or four bands can be configured in the uplink with simultaneous uplink transmission on up to two bands, and the corresponding inter-band CA requirements with uplink assigned to one or two bands shall apply. For each uplink band pair in the NR inter-band CA configurations, according to the capability *uplinkTxSwitchingOptionForBandPair-r18*,

– if *switchedUL* is supported, uplink transmission on any one band of the band pair in the band combination shall be supported according to the scheduling commands, and the corresponding inter-band CA requirements with uplink assigned to one band on band X or band Y apply;

– if *dualUL* is supported, simultaneous uplink transmission on the two NR UL bands from the band pair for which *dualUL* is declared in the band combination shall be supported according to the scheduling commands, and the corresponding inter-band CA requirements with uplink CA between the two uplink bands apply.

Low NR band inter-band CA configurations in which the UE is allowed to indicate support of the configuration via switching [*supportedLowBandSwitching-r19*] are indicated with the corresponding note in the configuration tables in sub-clause 5.5A.3.1.

<< unchanged content omitted >>

#### 5.5A.3.1 Configurations for inter-band CA (two bands)

<< unchanged content omitted >>

Table 5.5A.3.1-1d: NR CA configurations and bandwidth combinations
sets defined for inter-band CA (two bands)

| NR CA configuration | Uplink CA configuration or single uplink carrier10 | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
| --- | --- | --- | --- | --- |
| CA\_n5A-n7A | CA\_n5A-n7A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n7 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n7 | n7 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n7B | CA\_n5A-n7ACA\_n7B | n5 | 5, 10, 15, 20 | 0 |
|  |  | n7 | CA\_n7B\_BCS0 |  |
| CA\_n5A-n8A15 | - | n5 | 5, 10 | 0 |
|  |  | n8 | 5, 10 |  |
| CA\_n5A-n12A | CA\_n5A-n12A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n12 | 5, 10, 15 |  |
| CA\_n5B-n12A | CA\_n5A-n12ACA\_n5B | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n12 | 5, 10, 15 |  |
| CA\_n5A-n13A | CA\_n5A-n13A | n5 | 5, 10, 15, 20 | 4 and 5 |
|  |  | n13 | 5, 10 |  |
| CA\_n5B-n13A | CA\_n5A-n13A | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n13 | 5, 10 |  |
| CA\_n5A-n14A | CA\_n5A-n14A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n14 | 5, 10 |  |
| CA\_n5B-n14A | CA\_n5A-n14ACA\_n5B | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n14 | 5, 10 |  |
| CA\_n5A-n25A | CA\_n5A-n25A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n25 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n25 | n25 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n25(2A) | CA\_n5A-n25A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n25 | CA\_n25(2A)\_BCS0 |  |
| CA\_n5A-n28A | CA\_n5A-n28A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n28 | 5, 10, 15, 20, 30 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n28 | 5, 10, 15, 20, 25, 30 |  |
| CA\_n5A-n29A17 | - | n5 | 5, 10, 15, 20 | 0 |
|  |  | n29 | 5, 10 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n29 | n29 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5B-n29A | CA\_n5B | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n29 | 5, 10 |  |
| CA\_n5A-n30A | CA\_n5A-n30A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n30 | 5, 10 |  |
| CA\_n5A-n40A | CA\_n5A-n40A | n5 | 5, 10, 15, 20, 251 | 0 |
|  |  | n40 | 55, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80,90,100 |  |
| CA\_n5A-n41A | CA\_n5A-n41A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n48A | CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n48 | 5, 10, 15, 20, 40, 506, 606, 806, 906, 1006 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n48 | 5, 10, 15, 20, 30, 40, 506, 606,706, 806, 906, 1006 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n48 | n48 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n48(2A) | CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n48 | CA\_n48(2A)\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n48 | CA\_n48(2A)\_BCS1 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n48 | CA\_n48(2A)\_BCS 4 and 5 |  |
| CA\_n5A-n48B | CA\_n48BCA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n48 | CA\_n48B\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n48 | CA\_n48B\_BCS2 |  |
|  | CA\_n48BCA\_n5A-n48ACA\_n5A-n48B | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n48 | CA\_n48B\_BCS 4 and 5 |  |
| CA\_n5A-n48C | CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n48 | CA\_n48C\_BCS0 |  |
| CA\_n5A-n48(A-B) | CA\_n5A-n48A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n48 | CA\_n48(A-B)\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n48 | CA\_n48(A-B)\_BCS1 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n48 | CA\_n48(A-B)\_BCS 4 and 5 |  |
| CA\_n5B-n48A | CA\_n5BCA\_n5A-n48ACA\_n5B-n48A | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n48 | n48 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5B-n48B | CA\_n5BCA\_n48BCA\_n5A-n48ACA\_n5A-n48B | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n48 | CA\_n48B\_BCS 4 and 5 |  |
| CA\_n5B-n48(2A) | CA\_n5BCA\_n5A-n48A | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n48 | CA\_n48(2A)\_BCS 4 and 5 |  |
| CA\_n5A-n66A | n668CA\_n5A-n66A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n66 | 5, 10, 15, 20, 40 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n66B | CA\_n5A-n66A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n66 | CA\_n66B\_BCS0 |  |
| CA\_n5B-n66A | CA\_n5A-n66ACA\_n5B | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n66 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5B-n66B | CA\_n5A-n66A | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n66 | CA\_n66B\_BCS0 |  |
| CA\_n5A-n66(2A) | CA\_n5A-n66A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n66 | CA\_n66(2A)\_BCS1 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | CA\_n66(2A)\_BCS 4 and 5 |  |
| CA\_n5A-n66(3A) | CA\_n5A-n66A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n66 | CA\_n66(3A)\_BCS0 |  |
| CA\_n5B-n66(2A) | CA\_n5A-n66ACA\_n5B | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n66 | CA\_n66(2A)\_BCS1 |  |
|  |  | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | CA\_n66(2A)\_BCS 4 and 5 |  |
| CA\_n5A-n71A | - | n5 | 5, 10, 15, 20 | 0 |
|  |  | n71 | 5, 10, 15, 20 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n77A | n778,9CA\_n5A-n77A8,13,14 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n77B | CA\_n5A-n77An778,9 | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | CA\_n77B\_BCS 4 and 5 |  |
| CA\_n5A-n77(2A) | n778,9CA\_n5A-n77A8CA\_n77(2A)8 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n77 | CA\_n77(2A)\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n77 | CA\_n77(2A)\_BCS1 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | CA\_n77(2A)\_BCS4 and 5 |  |
| CA\_n5A-n77(3A) | n778,9CA\_n77(2A)8CA\_n5A-n77A8 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n77 | CA\_n77(3A)\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n77 | CA\_n77(3A)\_BCS1 |  |
|  |  | n5 | n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | CA\_n77(3A)\_BCS4 and 5 |  |
| CA\_n5(2A)-n77A | n778,9CA\_n5A-n77A8 | n5 | CA\_n5(2A)\_BCS0 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n5A-n77C | n778,9CA\_n5A-n77A8CA\_n77C | n5 | 5, 10, 15, 20 | 0 |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n77 | CA\_n77C\_BCS1 |  |
|  | CA\_n5A-n77ACA\_n77CCA\_n5A-n77C | n5 | See n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | CA\_n77C\_BCS 4 and 5 |  |
| CA\_n5(2A)-n77C | n778,9CA\_n77CCA\_n5A-n77A8 | n5 | CA\_n5(2A)\_BCS0 | 0 |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n5 | CA\_n5(2A)\_BCS0 | 1 |
|  |  | n77 | CA\_n77C\_BCS1 |  |
| CA\_n5B-n77A | n778,9CA\_n5A-n77A8CA\_n5B | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | CA\_n5A-n77ACA\_n5B | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5B-n77C | n778,9CA\_n5A-n77A8CA\_n5BCA\_n77C | n5 | CA\_n5B\_BCS0 | 0 |
|  |  | n77 | CA\_n77C\_BCS0 |  |
|  |  | n5 | CA\_n5B\_BCS0 | 1 |
|  |  | n77 | CA\_n77C\_BCS1 |  |
|  | CA\_n5A-n77ACA\_n5BCA\_n77CCA\_n5A-n77C | n5 | CA\_n5B\_BCS 4 and 5 | 4 and 5 |
|  |  | n77 | CA\_n77C\_BCS 4 and 5 |  |
| CA\_n5A-n78A | n788,9CA\_n5A-n78A8 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n5 | See n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n78 | See n78 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n78(2A) | n788,9CA\_n5A-n78A8CA\_n78(2A)8 | n5 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78(2A)\_BCS2 |  |
|  |  | n5 | See n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n78 | CA\_n78(2A)\_BCS4 and 5 |  |
| CA\_n5A-n78C | CA\_n5A-n78A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n78 | CA\_n78C\_BCS0 |  |
|  |  | n5 | 5, 10, 15, 20 | 1 |
|  |  | n78 | CA\_n78C\_BCS1 |  |
|  | CA\_n78CCA\_n5A-n78C | n5 | See n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n78 | CA\_n78C\_BCS4 and 5 |  |
| CA\_n5A-n78(A-C) | CA\_n78CCA\_n5A-n78A | n5 | 5, 10, 15, 20, 25 | 0 |
|  |  | n78 | CA\_n78(A-C)\_BCS1 |  |
| CA\_n5A-n79A | CA\_n5A-n79A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n5 | See n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n79 | See n79 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n5A-n79C | CA\_n5A-n79A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n79 | CA\_n79C\_BCS0 |  |
|  |  | n5 | See n5 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n79 | CA\_n79C\_BCS4 and 5 |  |
| CA\_n5A-n105A | CA\_n5A-n105A | n5 | 5, 10, 15, 20 | 0 |
|  |  | n105 | 5, 10, 15, 20, 25, 30, 35 |  |

<< unchanged content omitted >>

The following notes are applied to the above tables:

NOTE 1: This UE channel bandwidth is applicable only to downlink.

NOTE 2: The minimum requirements for intra-band contiguous or non-contiguous CA apply.

NOTE 3: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSs. For a given band, not all UE channel bandwidths support the same SCSs.

NOTE 4: This UE channel bandwidth is optional in this release of the specification.

NOTE 5: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.

NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an downlink SCell part of CA configuration

NOTE 7: Limited to operation at 3450-3550 MHz and 3700–3980 MHz.

NOTE 8: Minimum requirements for Power Class 2 are applicable for this uplink combination with 1Tx antenna connector in each band or single uplink carrier with up to 2Tx antenna connectors in this downlink/uplink combination

NOTE 9: Minimum requirements for Power Class 1.5 are applicable for this single uplink carrier with up to 2Tx antenna connectors in this downlink/uplink combination

NOTE 10: Only single uplink carriers with power class other than PC3 are listed.

NOTE 11: The CA configurations are given in Table 5.5A.1-1 or Table 5.5A.2-1 in this specification

NOTE 12: Void.

NOTE 13: Minimum requirements for Power Class 2 are applicable for this uplink configuration with 1Tx antenna connector in one band and 2Tx antenna connectors in the other band.

NOTE 14 Minimum requirements for Power Class 1.5 are applicable for this uplink configuration with 1Tx antenna connector in one band and 2Tx antenna connectors in the other band.

NOTE 15: Uplink is only in n5 for CA\_n5-n8.

NOTE 16: For UEs only supporting DL CA\_n26-n28, uplink support in band n26 is optional, if the UE supports CA\_n26-n28 UL configuration, it should also support UL in band n26 and n28.

NOTE 17: The UEs is allowed to indicate support of low NR band carrier aggregation via switching [*supportedLowBandSwitching-r19*] for this NR CA configuration

<question: how to indicate support of both conventional CA and via switching?>

<comment: two companies prefer to introduce a separate CA configuration table for combinations supported via switching>

<comment: several companies suggest sending an LS to RAN2 to clarify the impact of CA via switching on CA configuration signaling design: need to request tdoc for LS; Huawei will prepare a draft>

<< end change 2 >>

<< begin change 3 >>

#### 6.3A.3.3 Transmit ON/OFF time mask for inter-band CA

##### 6.3A.3.3.1 General

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the transmit ON/OFF time mask requirements in subclause 6.3.3 apply.

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the transmit ON/OFF time mask requirements in subclause 6.3A.3.1 apply for those carriers.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmit ON/OFF time mask requirements in subclause 6.3A.3.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

Time masks for Tx switching due to switching period are defined in clauses 6.3A.3.3.2-6.3A.3.3.5 for both single TAG and dual-TAG scenarios. When a UE is configured with dual-TAG with at least two cells corresponding to two TAGs involved in one switching event, the timing advance difference should be considered in the time masks in sub-clauses 6.3A.3.3.2-6.3A.3.3.5 for two uplink carriers or two uplink bands and in sub-clause 6.3A.3.3.6 for 3-4 uplink bands. The UE may omit uplink transmission on OFDM symbols that partially or fully overlap with the configured switching period for any timing advance difference.

When the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE, the length and location of allowed transient periods for dual TAG are as specified in 6.3A.3.3.2 – 6.3A.3.3.5 and in 6.3A.3.3.6 for a switching band pair with the UE scheduled or configured with uplink transmissions that do not result in

- simultaneous transmission on two antenna ports on one uplink carrier on one band, and any transmission on another uplink carrier on another band

- transmission of any of the carriers for a duration of at least the uplink switching gap indicated by UE capability

for any timing difference between uplink carriers in different bands up to the MTTD specified for UL CA in clause 7.5.4 of [7] in case of dual TAG.

Carriers within the same band belong to the same TAG in all cases.

For low NR band inter-band carrier aggregation via switching [*supportedLowBandSwitching-r19*], the general output power ON/OFF time mask specified in clause 6.3A.3.3.7 is applicable.

<< end change 3 >>

<< begin change 4 >>

##### 6.3A.3.3.7 Time mask for low NR band carrier aggregation via switching

For low NR band inter-band carrier aggregation supported via switching [*supportedLowBandSwitching-r19*], the time mask for UL transmissions in slots configured with switching gaps via RRC is specified in Figure 6.3A.3.3.7-1.



Figure 6.3A.3.3.7-1: ON/OFF time mask for NR UL transmission for DL CA via switching with non-CA in the UL

In the figure above, the switching period is shown for information only and may not necessarily be adjacent to the transient period. The time mask is applicable when the switching period does not overlap the FDD UL symbols in the case of SDL-FDD switch.

<comment: case with TA not zero can be further described in the TR>

<< end change 4 >>

<< begin change 5 >>

#### 7.3A.2.3 Reference sensitivity power level for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band the throughput 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, Table 7.3.2-2a, Table 7.3.2-3, and in Table 7.3F.2-1, Table 7.3F.2-2, Table 7.3F.2-3 for inter-band CA with one shared spectrum channel access band, modified in accordance with clause 7.3A.3.2. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active. Exceptions to reference sensitivity are allowed in accordance with clause 7.3A.4, 7.3A.5 and 7.3A.6. For low NR band inter-band configurations supported via switching [*supportedLowBandSwitching-r19*], the reference measurement channels are defined in Table A.3.2.2-1a and Table A.3.2.2-1b.

For the combination of intra-band and inter-band carrier aggregation, the intra-band CA relaxation, ΔRIBC and ΔRIBNC, are also applied according to the clause 7.3A.2.1 and 7.3A.2.2.

The reference sensitivity exceptions due to harmonic, harmonic mixing, cross band isolation and power class 2 or power class 3 CA intermodulation interferences are applicable to the UL aggressor band configured with either one Tx antenna connector or two Tx antenna connectors with UL MIMO or Tx diversity operation.

<< end change 5 >>

<< begin change 6 >>

### A.3.2.2 FRC for receiver requirements for QPSK

Table A.3.2.2-1 Fixed reference channel for receiver requirements (SCS 15 kHz, FDD, QPSK 1/3)

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Channel bandwidth | MHz | 3 | 5, 10, 15, 20 (Note 5) | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Subcarrier spacing configuration  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Allocated resource blocks |  | 15 | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per Frame |  | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| MCS Index |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| MCS Table for TBS determination |  | 64QAM |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 2,3,4,5,6,7,8,9 | Bits | 984 | 1672 | 3368 | 5120 | 6912 | 8712 | 10504 | 14088 | 17424 |
| Transport block CRC | Bits | 16 | 16 | 16 | 24 | 24 | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1 | CBs | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 2,3,4,5,6,7,8,9 | CBs | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |
| Binary Channel Bits per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 2,3,4,5,6,7,8,9 | Bits | 3240 | 5400 | 11232 | 17064 | 22896 | 28728 | 34560 | 46656 | 58320 |
| Max. Throughput averaged over 1 frame | Mbps | 0.787 | 1.338 | 2.694 | 4.096 | 5.530 | 6.970 | 8.403 | 11.270 | 13.9392 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).NOTE 3: SS/PBCH block is transmitted in slot #0 of each frameNOTE 4: Slot i is slot index per frameNOTE 5: Channel bandwidths 10, 15, and 20 MHz in this column only apply to UEs supporting IE *supportOfERedCap-r18* but not *eRedCapNotReducedBB-BW-r18*. |

Table A.3.2.2-1a Fixed reference channel for receiver requirements configured for low NR band inter-band carrier aggregation via switching [*supportedLowBandSwitching-r19*] (SCS 15 kHz, FDD, QPSK 1/3)

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Channel bandwidth | MHz | 3 | 5, 10, 15, 20 (Note 5) | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Subcarrier spacing configuration  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Allocated resource blocks |  | 15 | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per Frame |  | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| MCS Index |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| MCS Table for TBS determination |  | 64QAM |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,5,6,7,8 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 2,3,9 | Bits | 984 | 1672 | 3368 | 5120 | 6912 | 8712 | 10504 | 14088 | 17424 |
|  For Slot 4 | Bits | 504 | 1064 | 2600 | 4064 | 5576 | 7088 | 8648 | 11784 | 14808 |
| Transport block CRC | Bits | 16 | 16 | 16 | 24 | 24 | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,5,6,7,8 | CBs | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 2,3,9 | CBs | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |
|  For Slot 4 | CBs | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |
| Binary Channel Bits per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,5,6,7,8 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 2,3,9 | Bits | 3240 | 5400 | 11232 | 17064 | 22896 | 28728 | 34560 | 46656 | 58320 |
|  For Slot 4 | Bits | 2520 | 4200 | 8736 | 13272 | 17808 | 22344 | 26880 | 36288 | 45360 |
| Max. Throughput averaged over 1 frame | Mbps | 0.3456 | 0.6080 | 1.2704 | 1.9424 | 2.6312 | 3.3224 | 3.8600 | 5.4048 | 6.7080 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).NOTE 3: SS/PBCH block is transmitted in slot #0 of each frameNOTE 4: Slot i is slot index per frameNOTE 5: Channel bandwidths 10, 15, and 20 MHz in this column only apply to UEs supporting IE *supportOfERedCap-r18* but not *eRedCapNotReducedBB-BW-r18*. |

Table A.3.2.2-1b Fixed reference channel for receiver requirements configured for low NR band inter-band carrier aggregation via switching [*supportedLowBandSwitching-r19*] (SCS 15 kHz, SDL, QPSK 1/3)

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Channel bandwidth | MHz | 3 | 5, 10, 15, 20 (Note 5) | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Subcarrier spacing configuration  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Allocated resource blocks |  | 15 | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per Frame |  | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| MCS Index |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| MCS Table for TBS determination |  | 64QAM |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2,3,4,9 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 5,6,7 | Bits | 984 | 1672 | 3368 | 5120 | 6912 | 8712 | 10504 | 14088 | 17424 |
|  For Slot 8 |  | 504 | 1064 | 2600 | 4064 | 5576 | 7088 | 8648 | 11784 | 14808 |
| Transport block CRC | Bits | 16 | 16 | 16 | 24 | 24 | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2,3,4,9 | CBs | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 5,6,7 | CBs | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |
|  For Slot 8 | CBs | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |
| Binary Channel Bits per Slot |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2,3,4,9 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 5,6,7 | Bits | 3240 | 5400 | 11232 | 17064 | 22896 | 28728 | 34560 | 46656 | 58320 |
|  For Slots 8 | Bits | 2520 | 4200 | 8736 | 13272 | 17808 | 22344 | 26880 | 36288 | 45360 |
| Max. Throughput averaged over 1 frame | Mbps | 0.3456 | 0.6080 | 1.2704 | 1.9424 | 2.6312 | 3.3224 | 3.8600 | 5.4048 | 6.7080 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).NOTE 3: SS/PBCH block is transmitted in slot #0 of each frameNOTE 4: Slot i is slot index per frameNOTE 5: Channel bandwidths 10, 15, and 20 MHz in this column only apply to UEs supporting IE *supportOfERedCap-r18* but not *eRedCapNotReducedBB-BW-r18*. |

Table A.3.2.2-2 Fixed reference channel for receiver requirements (SCS 30 kHz, FDD, QPSK 1/3)

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Channel bandwidth | MHz | 10 | 10, 15, 20 (Note 5)  | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80 | 90 | 100 |
| Subcarrier spacing configuration  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Allocated resource blocks |  | 24 | 12 | 38 | 51 | 65 | 78 | 106 | 133 | 162 | 217 | 245 | 273 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per Frame |  | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| MCS Index |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| MCS Table for TBS determination |  | 64QAM |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 3,…,19 | Bits | 1608 | 808 | 2472 | 3368 | 4224 | 4992 | 6912 | 8712 | 10504 | 14088 | 15880 | 17928 |
| Transport block CRC | Bits | 16 | 16 | 16 | 16 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2 | CBs | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 3,…,19 | CBs | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 |
| Binary Channel Bits per Slot |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 3,…,19 | Bits | 5184 | 2592 | 8208 | 11016 | 14040 | 16848 | 22896 | 28728 | 34992 | 46872 | 52920 | 58968 |
| Max. Throughput averaged over 1 frame | Mbps | 2.734 | 1.374 | 4.202 | 5.726 | 7.181 | 8.486 | 11.750 | 14.810 | 17.857 | 23.950 | 26.996 | 30.478 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).NOTE 3: SS/PBCH block is transmitted in slot #0 of each frameNOTE 4: Slot i is slot index per frameNOTE 5: Channel bandwidths 10, 15, and 20 MHz in this column only apply to UEs supporting IE *supportOfERedCap-r18* but not *eRedCapNotReducedBB-BW-r18*. |

Table A.3.2.2-3 Fixed reference channel for receiver requirements (SCS 60 kHz, FDD, QPSK 1/3)

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| Channel bandwidth | MHz | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80 | 90 | 100 |
| Subcarrier spacing configuration  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Allocated resource blocks |  | 11 | 18 | 24 | 31 | 38 | 51 | 65 | 79 | 107 | 121 | 135 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per Frame |  | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| MCS Index |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| MCS Table for TBS Determination |  | 64QAM |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |  |  |  |  |  |  |  |
|  For Slots 0,1,2,3 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 4,…,39 | Bits | 736 | 1192 | 1608 | 2024 | 2472 | 3368 | 4224 | 5120 | 6912 | 7808 | 8712 |
| Transport block CRC | Bits | 16 | 16 | 16 | 16 | 16 | 16 | 24 | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |  |  |  |  |  |  |
|  For Slot 0,1,2,3 | CBs | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 4,…,39 | CBs | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| Binary Channel Bits per Slot |  |  |  |  |  |  |  |  |  |  |  |  |
|  For Slot 0,1,2,3 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|  For Slots 4,…,39 | Bits | 2376 | 3888 | 5184 | 6696 | 8208 | 11016 | 14040 | 17064 | 23112 | 26136 | 29160 |
| Max. Throughput averaged over 1 frame | Mbps | 2.650 | 4.291 | 5.789 | 7.286 | 8.899 | 12.125 | 15.206 | 18.432 | 24.883 | 28.109 | 31.363 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).NOTE 3: SS/PBCH block is transmitted in slot #0 of each frameNOTE 4: Slot i is slot index per frame |

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