**3GPP TSG-RAN WG4 Meeting #104-e *R4-2213059***

**Electronic Meeting, 15 - 26 August, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  | | | | | | | | |
| *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 |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft Big CR on Introduction of completed SUL band combinations into TS 38.101-1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_SUL\_combos\_R18-Core | | | | |  | ***Date:*** | | | 2022-08-27 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | 1. To introduce SUL configurations as below, based on endorsed CR R4-2213127   To introduce band combination SUL\_n78A-n81A\_BCS1 SUL\_n78C-n81A with UL configuration SUL\_n78A-n81A and SUL\_n78C-n81A   1. To introduce SUL band combinations as below, based on approved TP R4-2213128/ R4-2213129   CA\_n1A\_SUL\_n78A-n81A  CA\_n3A\_SUL\_n78C-n81A | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. To introduce SUL configurations as below   To introduce band combination SUL\_n78A-n81A\_BCS1 SUL\_n78C-n81A with UL configuration SUL\_n78A-n81A and SUL\_n78C-n81A   1. To introduce SUL band combinations as below   CA\_n1A\_SUL\_n78A-n81A  CA\_n3A\_SUL\_n78C-n81A | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | SUL configurations and SUL band combinations can’t be introduced into R18 spec. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2C, 5.5C, 6.2C, 7.3C | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## **<<Start of Change>>**

## 5.2C Operating band combination for SUL

NR operation is designed to operate in the operating band combination defined in Table 5.2C-1, Table 5.2C-2, Table 5.2C-3 and Table 5.2C-4, where all operating bands are within FR1.

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

Table 5.2C-1: Operating band combination for SUL in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n24-n992 | n24, n99 |
| SUL\_n41-n802 | n41, n80 |
| SUL\_n41-n812 | n41, n81 |
| SUL\_n41-n832 | n41, n83 |
| SUL\_n41-n952 | n41, n95 |
| SUL\_n41-n972 | n41, n97 |
| SUL\_n41-n982 | n41, n98 |
| SUL\_n41-n992 | n41, n99 |
| SUL\_n48-n992 | n48, n99 |
| SUL\_n77-n802 | n77, n80 |
| SUL\_n77-n842 | n77, n84 |
| SUL\_n77-n992 | n77, n99 |
| SUL\_n78-n802 | n78, n80 |
| SUL\_n78-n812 | n78, n81 |
| SUL\_n78-n822 | n78, n82 |
| SUL\_n78-n832 | n78, n83 |
| SUL\_n78-n842 | n78, n84 |
| SUL\_n78-n862 | n78, n86 |
| SUL\_n79-n802 | n79, n80 |
| SUL\_n79-n812 | n79, n81 |
| SUL\_n79-n832 | n79, n83 |
| SUL\_n79-n842 | n79, n84 |
| SUL\_n79-n952 | n79, n95 |
| SUL\_n79-n972 | n79, n97 |
| SUL\_n79-n982 | n79, n98 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory. | |

Table 5.2C-2: Operating SUL band combination with intra-band non-contiguous CA in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n41(\*)-n992 | n41, n99 |
| SUL\_n48(\*)-n992 | n48, n99 |
| SUL\_n77(\*)-n992 | n77, n99 |
| SUL\_n78(\*)-n862 | n78, n86 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.  NOTE 3: The notation CA\_nX(\*) in this table indicates intra-band non-contiguous CA for band nX. The configurations for each band are in table 5.5C-2. | |

Table 5.2C-3: Operating SUL band combination with intra-band contiguous CA in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n41-n80 | n41, n80 |
| SUL\_n41-n83 | n41, n83 |
| SUL\_n41-n95 | n41, n95 |
| SUL\_n78-n80 | n78, n80 |
| SUL\_n78-n84 | n78, n84 |
| SUL\_n79-n80 | n79, n80 |
| SUL\_n79-n83 | n79, n83 |
| SUL\_n79-n95 | n79, n95 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory. | |

Table 5.2C-4: Operating SUL band combination with inter-band CA in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| CA\_n1\_SUL\_n78-n80 | n1, n78, n80 |
| CA\_n1\_SUL\_n78-n81 | n1, n78, n81 |
| CA\_n1\_SUL\_n78-n84 | n1, n78, n84 |
| CA\_n3\_SUL\_n41-n80 | n3, n41, n80 |
| CA\_n3\_SUL\_n78-n80 | n3, n78, n80 |
| CA\_n3\_SUL\_n79-n80 | n3, n79, n80 |
| CA\_n28\_SUL\_n41-n83 | n28, n41, n83 |
| CA\_n28\_SUL\_n79-n83 | n28, n79, n83 |
| CA\_n41\_SUL\_n79-n80 | n41, n79, n80 |
| CA\_n41\_SUL\_n79-n83 | n41, n79, n83 |
| CA\_n41\_SUL\_n79-n97 | n41, n79, n97 |
| CA\_n79\_SUL\_n41-n80 | n41, n79, n80 |
| CA\_n79\_SUL\_n41-n83 | n41, n79, n83 |
| CA\_n79\_SUL\_n41-n97 | n41, n79, n97 |
| CA\_n28-n79\_SUL\_n41-n83 | n28, n41, n79, n83 |
| CA\_n28-n41\_SUL\_n79-n83 | n28, n41, n79, n83 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory. | |

## **<<End of Change>>**

## **<<Start of Change>>**

## 5.5C Configurations for SUL

The configuration tables for SUL describe Bandwidth Combination Sets. Bandwidth Combination Set 4 and 5 contains all possible defined channel bandwidths for each band in the combination. The fact that BCS4 and BCS5 contains all channel bandwidths for each band does not alter if a bandwidth is mandatory or optional for a given band. Bandwidths that are identified as optional in Table 5.3.5-1 for a given release are still optional for UEs that support BCS4 or BCS5. , where the bandwidths the UE supports for each band, the maximum bandwidth and/or minimum bandwidth for the band in the band combination are indicated in the UE capabilities. Note that the minimum bandwidth is indicated only in BCS5 and BCS5 shall not be indicated together with BCS4 for a SUL configuration. For SUL band combinations including FR1 intra-band CA and with BCS4 or BCS5, the Bandwidth Combination Sets for the FR1 intra-band CA are BCS4 or BCS5.

Table 5.5C-1: Supported channel bandwidths per SUL band combination

| SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- |
| SUL\_n24A-n99A | n24 | 5, 10 | 0 |
|  | n99 | 5, 10 |  |
| SUL\_n41A-n80A | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n80 | 5, 10, 15, 20, 25, 30 |  |
|  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 1 |
|  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n41A-n81A | n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n81 | 5, 10, 15, 20 |  |
| SUL\_n41A-n83A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n41A-n95A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | n95 | 5, 10, 15 |  |
| SUL\_n41A-n97A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | n97 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80 |  |
|  | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n97 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| SUL\_n41A-n98A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | n98 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n41A-n99A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  | n99 | 5, 10 |  |
| SUL\_n48A-n99A | n48 | 5, 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n99 | 5, 10 |  |
| SUL\_n77A-n80A | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n80 | 5, 10, 15, 20, 25, 30 |  |
| SUL\_n77A-n84A | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n84 | 5, 10, 15, 20 |  |
| SUL\_n77A-n99A | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n99 | 5, 10 |  |
| SUL\_n78A-n80A | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n80 | 5, 10, 15, 20, 25, 30 |  |
|  | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n78A-n81A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n81 | 5, 10, 15, 20 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n81 | 5, 10, 15, 20 |  |
| SUL\_n78A-n82A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n82 | 5, 10, 15, 20 |  |
| SUL\_n78A-n83A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n83 | 5, 10, 15, 20 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n78A-n84A | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
|  | n84 | 5, 10, 15, 20 |  |
|  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1 |
|  | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| SUL\_n78A-n86A | n78 | 10, 15, 20, 40, 50, 60, 70, 80, 90, 100 | 0 |
|  | n86 | 5, 10, 15, 20 |  |
| SUL\_n79A-n80A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n80 | 5, 10, 15, 20, 25, 30 |  |
|  | n79 | 40, 50, 60, 80, 100 | 1 |
|  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n79A-n81A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n81 | 5, 10, 15, 20 |  |
| SUL\_n79A-n83A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n79A-n84A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n84 | 5, 10, 15, 20 |  |
| SUL\_n79A-n95A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n95 | 5, 10, 15 |  |
| SUL\_n79A-n97A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n97 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80 |  |
|  | n79 | 40, 50, 60, 80, 100 | 1 |
|  | n97 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  | n79 | See n79 channel bandwidths in Table 5.3.5-1 for each carrier | BCS4 and BCS5 |
|  | n97 | See n97 channel bandwidths in Table 5.3.5-1 for each carrier |  |
| SUL\_n79A-n98A | n79 | 40, 50, 60, 80, 100 | 0 |
|  | n98 | 5, 10, 15, 20, 25, 30, 40 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | |

Table 5.5C-2: Supported channel bandwidths per SUL band combination with intra-band non-contiguous CA

| SUL band combination with intra-band non-contiguous CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- | --- |
| SUL\_n41(2A)-n99A | SUL\_n41A-n99A | n41 | See CA\_n41(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0 |
|  |  | n99 | 5, 10 |  |
| SUL\_n48(2A)-n99A | SUL\_n48A-n99A | n48 | See CA\_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0 |
|  |  | n99 | 5, 10 |  |
| SUL\_n77(2A)-n99A | SUL\_n77A-n99A | n77 | See CA\_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0 |
|  |  | n99 | 5, 10 |  |
| SUL\_n78(2A)-n86A | SUL\_n78A-n86A | n78 | See CA\_n78(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0 |
|  |  | n86 | 5, 10, 15, 20 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | | |

Table 5.5C-3: Supported channel bandwidths per SUL band combination with intra-band contiguous CA

| SUL band combination with CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- | --- |
| SUL\_n41C-n80A | SUL\_n41A-n80A | n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0 |
|  | SUL\_n41C-n80A | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n41C-n83A | SUL\_n41A-n83A | n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0 |
|  | SUL\_n41C-n83A | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n41C-n95A | SUL\_n41A-n95A | n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0 |
|  | SUL\_n41C-n95A | n95 | 5, 10, 15 |  |
| SUL\_n78C-n80A | SUL\_n78A-n80A | n78 | See CA\_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0 |
|  | SUL\_n78C-n80A | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n78C-n81A | SUL\_n78A-n81A | n78 | See CA\_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0 |
|  | SUL\_n78C-n81A | n81 | 5, 10, 15, 20 |  |
| SUL\_n78C-n84A | SUL\_n78A-n84A | n78 | See CA\_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0 |
|  | SUL\_n78C-n84A | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| SUL\_n79C-n80A | SUL\_n79A-n80A | n79 | See CA\_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 | 0 |
|  | SUL\_n79C-n80A | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| SUL\_n79C-n83A | SUL\_n79A-n83A | n79 | See CA\_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 | 0 |
|  | SUL\_n79C-n83A | n83 | 5, 10, 15, 20, 30 |  |
| SUL\_n79C-n95A | SUL\_n79A-n95A | n79 | See CA\_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 | 0 |
|  | SUL\_n79C-n95A | n95 | 5, 10, 15 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | | |

Table 5.5C-4: Supported channel bandwidths per SUL band combination with inter-band CA

| SUL band combination with CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| --- | --- | --- | --- | --- |
| CA\_n1A\_SUL\_n78A-n80A | SUL\_n78A-n80A | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
|  |  | n1 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| CA\_n1A\_SUL\_n78A-n81A | SUL\_n78A-n81A | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0 |
|  |  | n81 | 5, 10, 15, 20 |  |
| CA\_n1A\_SUL\_n78A-n84A | SUL\_n78A-n84A | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| CA\_n1A\_SUL\_n78C-n84A | SUL\_n78A-n84A | n1 | 5, 10, 15, 20, 25, 30, 40, 50 | 0 |
|  | SUL\_n78C-n84A | n78 | See CA\_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 |  |
|  |  | n84 | 5, 10, 15, 20, 25, 30, 40, 50 |  |
| CA\_n3A\_SUL\_n41A-n80A | SUL\_n41A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n3A\_SUL\_n41C-n80A | SUL\_n41A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  | SUL\_n41C-n80A | n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n3A\_SUL\_n78A-n80A | SUL\_n78A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n3A\_SUL\_n78C-n80A | SUL\_n78A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  | SUL\_n78C-n80A | n78 | See CA\_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n3A\_SUL\_n79A-n80A | SUL\_n79A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n3A\_SUL\_n79C-n80A | SUL\_n79A-n80A | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
|  | SUL\_n79C-n80A | n79 | See CA\_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n28A\_SUL\_n41A-n83A | SUL\_n41A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n28A\_SUL\_n41C-n83A | SUL\_n41A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  | SUL\_n41C-n83A | n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n28A\_SUL\_n79A-n83A | SUL\_n79A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n28A\_SUL\_n79C-n83A | SUL\_n79A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  | SUL\_n79C-n83A | n79 | See CA\_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n41A\_SUL\_n79A-n80A | SUL\_n79A-n80A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n41A\_SUL\_n79A-n83A | SUL\_n79A-n83A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n41A\_SUL\_n79A-n97A | SUL\_n79A-n97A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n97 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n79A\_SUL\_n41A-n80A | SUL\_n41A-n80A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n80 | 5, 10, 15, 20, 25, 30, 40 |  |
| CA\_n79A\_SUL\_n41A-n83A | SUL\_n41A-n83A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n79A\_SUL\_n41A-n97A | SUL\_n41A-n97A | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 | 0 |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n97 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  |
| CA\_n28A-n79A\_SUL\_n41A-n83A | SUL\_n41A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |  |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| CA\_n28A-n41A\_SUL\_n79A-n83A | SUL\_n79A-n83A | n28 | 5, 10, 15, 20, 30 | 0 |
|  |  | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |  |
|  |  | n79 | 40, 50, 60, 80, 100 |  |
|  |  | n83 | 5, 10, 15, 20, 30 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. | | | | |

## **<<End of Change>>**

## **<<Start of Change>>**

## 6.2C Transmitter power for SUL

### 6.2C.1 Configured transmitted power for SUL

When a UE is configured with both NR UL and NR SUL carriers in a serving cell with active transmission either on the UL carrier(s) or SUL carrier, the configured transmit power requirements specified in clause 6.2.4 and 6.2A.4 are applicable for the UL carrier(s) and the SUL carrier, respectively.

If a UE supports a different power class than the default UE power class for NR UL band of SUL combination and the supported power class enables the higher maximum output power for SUL combination than that of the default power class:

– if the field of UE capability *maxUplinkDutyCycle- SULcombination-PC2* is not absent and the average percentage of uplink symbols transmitted in a certain evaluation period is larger than the maximum percentage of uplink symbols that the UE indicates by *maxUplinkDutyCycle- SULcombination-PC2* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or

– if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the default power class or lower;

– shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2.4;

– else;

– shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2.4 (regardless of the average percentage of uplink symbols if the field of UE capability maxUplinkDutyCycle-interBandCA-PC2 is absent).

The average percentage of uplink symbols is defined as 50% × ( DutyNR, x /maxDutyNR,x + DutyNR, y /maxDutyNR,y, ). DutyNR, x, DutyNR, y represent the actual percentage of uplink symbols transmitted in the same evaluation period (The exact evaluation period is no less than one radio frame) for NR Band x, NR Band y respectively maxDutyNR,x,maxDutyNR,y represent the field of UE capability *maxUplinkDutyCycle-PC2-FR1* per band as defined in TS 38.331. For NR Band x or NR Band y,

– if power class of one or both of the bands within the band combination is power class 2 and the corresponding UE capability maxUplinkDutyCycle-PC2-FR1 is absent;

– the corresponding maxDutyNR,x or maxDutyNR,y is equal to 50%;

– else if the band is configured with power class 3;

– the corresponding maxDutyNR,x or maxDutyNR,y is equal to 100%.

### 6.2C.2 ΔTIB,c

For the UE which supports SUL band combination, ΔTIB,c in Tables below applies. Unless otherwise stated, ΔTIB,c is set to zero.

Table 6.2C.2-1: ΔTIB,c due to SUL

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔTIB,c (dB) |
| SUL\_n41-n80 | n41 | 0.31 |
|  |  | 0.82 |
|  | n80 | 0.5 |
| SUL\_n41-n81 | n41 | 0.3 |
|  | n81 | 0.3 |
| SUL\_n41-n83 | n41 | 0.3 |
|  | n83 | 0.3 |
| SUL\_n41-n97 | n41 | 0.5 |
|  | n97 | 0.5 |
| SUL\_n41-n98 | n41 | 0.5 |
|  | n98 | 0.5 |
| SUL\_n41-n99 | n41 | 0.41 |
|  |  | 0.92 |
|  | n99 | 0.3 |
| SUL\_n48-n99 | n48 | 0.6 |
|  | n99 | 0.8 |
| SUL\_n77-n80 | n77 | 0.8 |
|  | n80 | 0.6 |
| SUL\_n77-n84 | n77 | 0.8 |
|  | n84 | 0.6 |
| SUL\_n77-n99 | n77 | 0.6 |
|  | n99 | 0.8 |
| SUL\_n78-n80 | n78 | 0.8 |
|  | n80 | 0.6 |
| SUL\_n78-n81 | n78 | 0.8 |
|  | n81 | 0.6 |
| SUL\_n78-n82 | n78 | 0.8 |
|  | n82 | 0.6 |
| SUL\_n78-n83 | n78 | 0.8 |
|  | n83 | 0.5 |
| SUL\_n78-n84 | n78 | 0.8 |
|  | n84 | 0.3 |
| SUL\_n78-n86 | n78 | 0.8 |
|  | n86 | 0.6 |
| SUL\_n79-n83 | n79 | 0.8 |
|  | n83 | 0.5 |
| SUL\_n79-n97 | n79 | 0.8 |
|  | n98 | 0.3 |
| SUL\_n79-n98 | n79 | 0.8 |
|  | n98 | 0.3 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 - 2515 MHz. | | |

Table 6.2C.2-2: ΔTIB,c for SUL band combination (Three bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔTIB,c (dB) |
| CA\_n1\_SUL\_n78-n80 | n1 | 0.6 |
|  | n78 | 0.8 |
|  | n80 | 0.6 |
|  | n1 | 0.3 |
| CA\_n1\_SUL\_n78-n81 | n78 | 0.8 |
|  | n81 | 0.6 |
| CA\_n1\_SUL\_n78-n84 | n1 | 0.6 |
|  | n78 | 0.8 |
|  | n84 | 0.6 |
| CA\_n3\_SUL\_n41-n80 | n3 | 0.5 |
|  | n41 | 0.31 |
|  |  | 0.82 |
|  | n80 | 0.5 |
| CA\_n3\_SUL\_n78-n80 | n3 | 0.6 |
|  | n78 | 0.8 |
|  | n80 | 0.6 |
| CA\_n3\_SUL\_n79-n80 | n3 | 0.3 |
|  | n79 | 0.8 |
|  | n80 | 0.3 |
| CA\_n28\_SUL\_n41-n83 | n28 | 0.3 |
|  | n41 | 0.3 |
|  | n83 | 0.3 |
| CA\_n28\_SUL\_n79-n83 | n28 | 0.5 |
|  | n79 | 0.8 |
|  | n83 | 0.5 |
| CA\_n41\_SUL\_n79-n80 | n41 | 0.31 |
|  |  | 0.82 |
|  | n79 | 0.8 |
|  | n80 | 0.3 |
| CA\_n41\_SUL\_n79-n83 | n41 | 0.3 |
|  | n79 | 0.8 |
|  | n83 | 0.5 |
| CA\_n41\_SUL\_n79-n97 | n41 | 0.5 |
|  | n79 | 0.5 |
|  | n97 | 0.5 |
| CA\_n79\_SUL\_n41-n80 | n41 | 0.31 |
|  |  | 0.82 |
|  | n79 | 0.8 |
|  | n80 | 0.3 |
| CA\_n79\_SUL\_n41-n83 | n41 | 0.3 |
|  | n79 | 0.8 |
|  | n83 | 0.5 |
| CA\_n79\_SUL\_n41-n97 | n41 | 0.5 |
|  | n79 | 0.5 |
|  | n97 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.  NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. | | |

Table 6.2C.2-3: ΔTIB,c for SUL band combination (Four bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔTIB,c (dB) |
| CA\_n28-n79\_SUL\_n41-n83 | n28 | 0.3 |
|  | n41 | 0.3 |
|  | n79 | 0.5 |
|  | n83 | 0.3 |
| CA\_n28-n41\_SUL\_n79-n83 | n28 | 0.3 |
|  | n41 | 0.3 |
|  | n79 | 0.5 |
|  | n83 | 0.3 |

## **<<End of Change>>**

## **<<Start of Change>>**

## 7.3C Reference sensitivity for SUL

### 7.3C.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

### 7.3C.2 Reference sensitivity power level for SUL

For SUL operation, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in Table 7.3.2-1a, Table 7.3.2-1b and Table 7.3.2-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with 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), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

For SUL operation with downlink CA, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in clause 7.3A.2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with 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), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

Table 7.3C.2-1: Supplementary uplink configuration for reference sensitivity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS of SUL band / Channel bandwidth of the DL band / NRB | | | | | | | | | | | | | | | |
| DL band | SUL band | SCS of SUL band  (kHz) | 5  MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz |
| n1 | n80 | 15 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |  |  |  |  |  |  |
| n1 | n81 | 15 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |  |  |  |  |  |
| n1 | n841 | 15 | 25 | 50 | 75 | 100 | 128 | 128 | 128 | 128 |  |  |  |  |  |
| n3 | n801 | 15 | 25 | 50 | 50 | 50 | 50 | 50 | 50 |  |  |  |  |  |  |
| n24 | n99 | 15 | 25 | 50 |  |  |  |  |  |  |  |  |  |  |  |
| n28 | n831 | 15 | 25 | 25 | 25 | 25 |  | 25 |  |  |  |  |  |  |  |
| n41 | n80 | 15 |  | 160 | 160 | 160 |  | 160 | 160 | 160 | 160 |  | 160 | 160 | 160 |
| n41 | n81 | 15 |  | 100 | 100 | 100 |  |  | 100 | 100 | 100 |  | 100 | 100 | 100 |
| n41 | n83 | 15 |  | 100 | 100 | 100 |  | 100 | 100 | 100 | 100 |  | 100 | 100 | 100 |
|  |  | 30 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 |  | 50 | 50 | 50 |
| n41 | n95 | 15 |  | 75 | 75 | 75 |  | 75 | 75 | 75 | 75 |  | 75 | 75 | 75 |
| n41 | n97 | 30 |  | 216 | 216 | 216 |  | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| n41 | n98 | 15 |  | 216 | 216 | 216 |  | 216 | 216 | 216 | 216 |  | 216 | 216 | 216 |
| n41 | n99 | 15 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 |  | 50 | 50 | 50 |
| n48 | n99 | 15 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 |  | 50 | 50 | 50 |
| n77 | n80 | 15 |  | 160 | 160 | 160 |  |  | 160 | 160 | 160 |  | 160 | 160 | 160 |
| n77 | n84 | 15 |  | 100 | 100 | 100 |  |  | 100 | 100 | 100 |  | 100 | 100 | 100 |
| n77 | n99 | 15 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n78 | n80 | 15 |  | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| n78 | n81 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n82 | 15 |  | 100 | 100 | 100 |  |  | 100 | 100 | 100 |  | 100 | 100 | 100 |
| n78 | n83 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n84 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n86 | 15 |  | 216 | 216 | 216 |  |  | 216 | 216 | 216 |  | 216 | 216 | 216 |
| n79 | n80 | 15 |  |  |  |  |  |  | 160 | 160 | 160 |  | 160 |  | 160 |
| n79 | n83 | 15 |  |  |  |  |  |  | 100 | 100 | 100 |  | 100 |  | 100 |
|  |  | 30 |  |  |  |  |  |  | 50 | 50 | 50 |  | 50 |  | 50 |
| n79 | n81 | 15 |  |  |  |  |  |  | 100 | 100 | 100 |  | 100 |  | 100 |
| n79 | n84 | 15 |  |  |  |  |  |  | 100 | 100 | 100 |  | 100 |  | 100 |
| n79 | n95 | 15 |  |  |  |  |  |  | 75 | 75 | 75 |  | 75 |  | 75 |
| n79 | n97 | 15 |  |  |  |  |  |  | 270 | 270 | 270 |  | 270 |  | 270 |
| n79 | n98 | 15 |  |  |  |  |  |  | 216 | 216 | 216 |  | 216 |  | 216 |
| NOTE 1: The Tx-Rx carrier center frequency separation between SUL band and DL band is the same as the Tx-Rx carrier center frequency separation of DL band specified in table 5.4.4-1 from TS 38.101-1. The channel bandwidth of SUL band is the same as DL band. This restriction of REFSENS configurations applies also for these carriers when applicable SUL configuration is part of a higher order configuration. | | | | | | | | | | | | | | | |

For the UE that supports any of the SUL operation given in Table 7.3C.2-2, exceptions to the requirements specified in Table 7.3.2-1a and Table 7.3.2-1b are allowed for different combinations of UL configurations and DL channel bandwidths when the uplink is active in a lower frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3C.2-2. For these exceptions, only the listed test points in Table 7.3C.2-2 are needed to be tested.

Table 7.3C.2-2: Reference sensitivity and uplink/downlink configurations for SUL operation (exceptions due to harmonic issue)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n80 | n77 | 5 | 15 | 25 (RBstart=0) | 10 | 23.9 | NOTE 2 | UL2/DL1  direct-hit |
| n80 | n77 | 10 | 15 | 50 (RBstart=0) | 100 | 13.8 | NOTE 2 | UL2/DL1  direct-hit |
| n80 | n77 | 5 | 15 | 25 (RBstart=0) | 10 | 1.1 | NOTE 6 | UL2/DL1  near-miss |
| n80 | n78 | 5 | 15 | 25 (RBstart=0) | 10 | 23.9 | NOTE 2 | UL2/DL1  direct-hit |
| n80 | n78 | 10 | 15 | 50 (RBstart=0) | 100 | 13.8 | NOTE 2 | UL2/DL1  direct-hit |
| n80 | n78 | 5 | 15 | 25 (RBstart=0) | 10 | 1.1 | NOTE 6 | UL2/DL1  near-miss |
| n81 | n41 | 5 | 15 | 16 (RBstart=4) | 10 | 13 | NOTE 3 | UL3/DL1  direct-hit |
| n81 | n41 | 5 | 15 | 25 (RBstart=0) | 100 | 3.5 | NOTE 3 | UL3/DL1  direct-hit |
| n81 | n78 | 5 | 15 | 16 (RBstart=4) | 10 | 10.8 | NOTE 4 | UL4/DL1  direct-hit |
| n81 | n78 | 5 | 15 | 25 (RBstart=0) | 100 | 1.4 | NOTE 4 | UL4/DL1  direct-hit |
| n81 | n79 | 5 | 15 | 25 (RBstart=0) | 40 | 6.8 | NOTE 5 | UL5/DL1  direct-hit |
| n81 | n79 | 5 | 15 | 25 (RBstart=0) | 100 | 4.4 | NOTE 5 | UL5/DL1  direct-hit |
| n82 | n78 | 5 | 15 | 16 (RBstart=4) | 10 | 10.8 | NOTE 4 | UL4/DL1  direct-hit |
| n82 | n78 | 5 | 15 | 20 (RBstart=2) | 100 | 1.0 | NOTE 4 | UL4/DL1  direct-hit |
| n83 | n78 | 5 | 15 | 10 (RBstart=8) | 10 | 10.4 | NOTE 5 | UL5/DL1  direct-hit |
| n83 | n78 | 5 | 15 | 25 (RBstart=0) | 100 | 0.7 | NOTE 5 | UL5/DL1  direct-hit |
| n84 | n77 | 5 | 15 | 25 (RBstart=0) | 10 | 23.9 | NOTE 2 | UL2/DL1  direct-hit |
| n84 | n77 | 10 | 15 | 100 (RBstart=0) | 100 | 13.8 | NOTE 2 | UL2/DL1  direct-hit |
| n84 | n77 | 5 | 15 | 25 (RBstart=0) | 10 | 1.1 | NOTE 6 | UL2/DL1  near-miss |
| n86 | n78 | 5 | 15 | 25 (RBstart=0) | 10 | 23.9 | NOTE 2 | UL2/DL1  direct-hit |
| n86 | n78 | 10 | 15 | 100 (RBstart=0) | 100 | 13.8 | NOTE 2 | UL2/DL1  direct-hit |
| n86 | n78 | 5 | 15 | 25 (RBstart=0) | 10 | 1.1 | NOTE 6 | UL2/DL1  near-miss |
| n97 | n79 | 5 | 15 | 100 (RBstart=0) | 40 | 29.4 | NOTE 2 | UL2/DL1  direct-hit |
| n97 | n79 | 5 | 15 | 270 (RBstart=0) | 100 | 25.3 | NOTE 2 | UL2/DL1  direct-hit |
| n99 | n77 | 5 | 15 | 25 (RBstart=0) | 10 | 23.9 | NOTE 2 | UL2/DL1  direct-hit |
| n99 | n77 | 10 | 15 | 100 (RBstart=0) | 100 | 13.8 | NOTE 2 | UL2/DL1  direct-hit |
| n99 | n77 | 5 | 15 | 25 (RBstart=0) | 10 | 1.1 | NOTE 6 | UL2/DL1  near-miss |
| NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd / 3rd / 4th / 5th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.  NOTE 2: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.  NOTE 3: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that  in MHz and  with the carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the low band.  NOTE 4: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 5: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 6: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at  MHz offset from  in the victim (higher band) with , whereandare the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively. | | | | | | | | |

Table 7.3C.2-3: Void

For the UE that supports any of the SUL operation given in Table 7.3C.2-4, reference sensitivity degradation is allowed for different combinations of UL configurations and DL channel bandwidths when a DL band is impacted by UL band due to cross band isolation issues. For these exceptions, only the listed test points in Table 7.3C.2-4 are needed to be tested.

Table 7.3C.2-4: Reference sensitivity and uplink/downlink configurations for SUL operation (exceptions due to cross band isolation)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **X band interference source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n80 | n41 | 1780 | 10 | 15 | 50 (RBstart=0) | 2505 | 10 | 4.3 | >ACLR2 |
| n80 | n41 | 1780 | 10 | 15 | 50 (RBstart=0) | 2550 | 100 | 3.0 | >ACLR2 |
| n95 | n41 | 2017.5 | 15 | 15 | 75 (RBstart=4) | 2505 | 10 | 6.1 | >ACLR2 |
| n95 | n41 | 2017.5 | 15 | 15 | 75 (RBstart=0) | 2550 | 100 | 6.1 | >ACLR2 |
| n97 | n41 | 2360 | 80 | 30 | 216 (RBstart=1) | 2505 | 10 | 20.7 | ACLR2 |
| n97 | n41 | 2360 | 80 | 30 | 216 (RBstart=0) | 2550 | 100 | 10.6 | ACLR2 |
|  | | | | | | | | | |

Table 7.3C.2-5: Void

### 7.3C.3 ΔRIB,c for SUL

#### 7.3C.3.1 General

For a UE supporting a SUL configuration, the ΔRIB,c applies for both SC and SUL operation.

#### 7.3C.3.2 SUL band combination

For the UE which supports SUL band combiantion, the minimum requirement for reference sensitivity in clause 7.3C.2 shall be increased by the amount given in ΔRIB,c defined in clause 7.3C.3.2 for the applicable operating bands. Unless otherwise stated, ΔRIB,c is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is ≤ 1 GHz, the applicable additional ΔRIB,c shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum ΔRIB,c among the different supported band combinations involving such band shall be applied

- When the operating band frequency range is > 1 GHz, the applicable additional ΔRIB,c shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

##### 7.3C.3.2.1 ΔRIB,c for two bands

Table 7.3C.3.2.1-1: ΔRIB,c due to SUL (two bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔRIB,c (dB) |
| SUL\_n41-n80 | n41 | 0.5 (note) |
| SUL\_n41-n95 | n41 | 0.2 |
| SUL\_n41-n98 | n41 | 0.2 |
| SUL\_n48-n99 | n48 | 0.5 |
| SUL\_n77-n80 | n77 | 0.5 |
| SUL\_n77-n84 | n77 | 0.5 |
| SUL\_n77-n99 | n77 | 0.5 |
| SUL\_n78-n80 | n78 | 0.5 |
| SUL\_n78-n81 | n78 | 0.5 |
| SUL\_n78-n82 | n78 | 0.5 |
| SUL\_n78-n83 | n78 | 0.5 |
| SUL\_n78-n84 | n78 | 0.5 |
| SUL\_n78-n86 | n78 | 0.5 |
| SUL\_n79-n83 | n79 | 0.5 |
| SUL\_n79-n97 | n79 | 0.5 |
| SUL\_n79-n98 | n79 | 0.5 |
| NOTE: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

##### 7.3C.3.2.2 ΔRIB,c for three bands

Table 7.3C.3.2.2-1: ΔRIB,c due to SUL (three bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔRIB,c (dB) |
| CA\_n1\_SUL\_n78-n80 | n1 | 0.2 |
|  | n78 | 0.5 |
| CA\_n1\_SUL\_n78-n81 | n1 | 0 |
|  | n78 | 0.5 |
| CA\_n1\_SUL\_n78-n84 | n1 | 0.2 |
|  | n78 | 0.5 |
| CA\_n3\_SUL\_n41-n80 | n41 | 0.5 (note) |
| CA\_n3\_SUL\_n78-n80 | n3 | 0.2 |
|  | n78 | 0.5 |
| CA\_n3\_SUL\_n79-n80 | n79 | 0.5 |
| CA\_n28\_SUL\_n41-n83 | n28 | 0.2 |
| CA\_n28\_SUL\_n79-n83 | n28 | 0.2 |
|  | n79 | 0.5 |
| CA\_n41\_SUL\_n79-n80 | n41 | 0.5 |
|  | n79 | 0.5 |
| CA\_n41\_SUL\_n79-n83 | n41 | 0.5 |
|  | n79 | 0.5 |
| CA\_n41\_SUL\_n79-n97 | n41 | 0 |
|  | n79 | 0.8 |
| CA\_n79\_SUL\_n41-n80 | n41 | 0.5 |
|  | n79 | 0.5 |
| CA\_n79\_SUL\_n41-n83 | n41 | 0.5 |
|  | n79 | 0.5 |
| CA\_n79\_SUL\_n41-n97 | n41 | 0 |
|  | n79 | 0.8 |
| NOTE: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

##### 7.3C.3.2.3 ΔRIB,c for four bands

Table 7.3C.3.2.3-1: ΔRIB,c due to SUL (four bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔRIB,c (dB) |
| CA\_n28-n79\_SUL\_n41-n83 | n28 | 0.2 |
|  | n41 | 0 |
|  | n79 | 0.8 |
| CA\_n28-n41\_SUL\_n79-n83 | n28 | 0.2 |
|  | n41 | 0 |
|  | n79 | 0.8 |
|  | | |

## **<<End of Change>>**