**3GPP TSG-RAN WG4 Meeting #104-e *R4-221xxxx***

**Electronic meeting, August 15 – 26, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.104** | **CR** | XXXX | **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 |  | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Big CR of TS 38.104 on system parameter updates for FR2-2 |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_ext\_to\_71GHz-Core |  | ***Date:*** | 10-08-2022 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | R4-2214480 Draft CR for TS 38.104 on system parameter updates for FR2-2: This is draft CR to TS 38.104 Rel-17 which introduces CA operation in FR2-2.  |
|  |  |
| ***Summary of change:*** |  R4-2214480 Draft CR for TS 38.104 on system parameter updates for FR2-2:* Square brackets removed from transmission bandwidth configurations and minimum guardbands for 800 and 1600 MHz channel bandwidths
* Added reference to correct table for defining Aggregated CA channel bandwidth
* Channel spacing for adjacent NR carriers and channel spacing for CA added for n263
 |
|  |  |
| ***Consequences if not approved:*** | R4-2214480 Draft CR for TS 38.104 on system parameter updates for FR2-2:Square brackets remain. CA operation is not support for n263. |
|  |  |
| ***Clauses affected:*** | 5.3.2, 5.3.3, 5.3A.2, 5.4.1.1, 5.4.1.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ... |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## 5.2 *Operating bands*

NR is designed to operate in the *operating bands* defined in table 5.2-1 and 5.2-2.

NR operating band n1, which is defined in Table 5.2-1, can be applied for HAPS operation.

NB-IoT is designed to operate in the NR operating bands n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n25, n26, n28, n41, n65, n66, n70, n71, n74, n85, n90 which are defined in Table 5.2-1.

Table 5.2-1: NR *operating bands* in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | Uplink (UL) *operating band*BS receive / UE transmitFUL,low – FUL,high | Downlink (DL) *operating band*BS transmit / UE receiveFDL,low – FDL,high | Duplex mode |
| n1 | 1920 MHz – 1980 MHz | 2110 MHz – 2170 MHz | FDD |
| n2 | 1850 MHz – 1910 MHz | 1930 MHz – 1990 MHz | FDD |
| n3 | 1710 MHz – 1785 MHz | 1805 MHz – 1880 MHz | FDD |
| n5 | 824 MHz – 849 MHz | 869 MHz – 894 MHz | FDD |
| n7 | 2500 MHz – 2570 MHz | 2620 MHz – 2690 MHz | FDD |
| n8 | 880 MHz – 915 MHz | 925 MHz – 960 MHz | FDD |
| n12 | 699 MHz – 716 MHz | 729 MHz – 746 MHz | FDD |
| n13 | 777 MHz – 787 MHz | 746 MHz – 756 MHz | FDD |
| n14 | 788 MHz – 798 MHz | 758 MHz – 768 MHz | FDD |
| n18 | 815 MHz – 830 MHz | 860 MHz – 875 MHz | FDD |
| n20 | 832 MHz – 862 MHz | 791 MHz – 821 MHz | FDD |
| n247 | 1626.5 MHz – 1660.5 MHz | 1525 MHz – 1559 MHz | FDD |
| n25 | 1850 MHz – 1915 MHz | 1930 MHz – 1995 MHz | FDD |
| n26 | 814 MHz – 849 MHz | 859 MHz – 894 MHz | FDD |
| n28 | 703 MHz – 748 MHz | 758 MHz – 803 MHz | FDD |
| n29 | N/A | 717 MHz – 728 MHz | SDL |
| n30 | 2305 MHz – 2315 MHz | 2350 MHz – 2360 MHz | FDD |
| n34 | 2010 MHz – 2025 MHz | 2010 MHz – 2025 MHz | TDD |
| n38 | 2570 MHz – 2620 MHz | 2570 MHz – 2620 MHz | TDD |
| n39 | 1880 MHz – 1920 MHz | 1880 MHz – 1920 MHz | TDD |
| n40 | 2300 MHz – 2400 MHz | 2300 MHz – 2400 MHz | TDD |
| n41 | 2496 MHz – 2690 MHz | 2496 MHz – 2690 MHz | TDD |
| n46 | 5150 MHz – 5925 MHz  | 5150 MHz – 5925 MHz | TDD(NOTE 3) |
| n48 | 3550 MHz – 3700 MHz | 3550 MHz – 3700 MHz | TDD |
| n50 | 1432 MHz – 1517 MHz | 1432 MHz – 1517 MHz | TDD |
| n51 | 1427 MHz – 1432 MHz | 1427 MHz – 1432 MHz | TDD |
| n53 | 2483.5 MHz – 2495 MHz | 2483.5 MHz – 2495 MHz | TDD |
| n65 | 1920 MHz – 2010 MHz | 2110 MHz – 2200 MHz | FDD |
| n66 | 1710 MHz – 1780 MHz | 2110 MHz – 2200 MHz | FDD |
| n67 | N/A | 738 MHz – 758 MHz | SDL |
| n70 | 1695 MHz – 1710 MHz | 1995 MHz – 2020 MHz | FDD |
| n71 | 663 MHz – 698 MHz | 617 MHz – 652 MHz | FDD |
| n74 | 1427 MHz – 1470 MHz | 1475 MHz – 1518 MHz | FDD |
| n75 | N/A | 1432 MHz – 1517 MHz | SDL |
| n76 | N/A | 1427 MHz – 1432 MHz | SDL |
| n77 | 3300 MHz – 4200 MHz | 3300 MHz – 4200 MHz | TDD |
| n78 | 3300 MHz – 3800 MHz | 3300 MHz – 3800 MHz | TDD |
| n79 | 4400 MHz – 5000 MHz | 4400 MHz – 5000 MHz | TDD |
| n80 | 1710 MHz – 1785 MHz | N/A | SUL  |
| n81 | 880 MHz – 915 MHz | N/A | SUL  |
| n82 | 832 MHz – 862 MHz | N/A | SUL  |
| n83 | 703 MHz – 748 MHz | N/A | SUL |
| n84 | 1920 MHz – 1980 MHz | N/A | SUL |
| n85 | 698 MHz – 716 MHz  | 728 MHz – 746 MHz | FDD |
| n86 | 1710 MHz – 1780 MHz | N/A | SUL |
| n89 | 824 MHz – 849 MHz | N/A | SUL |
| n90 | 2496 MHz – 2690 MHz | 2496 MHz – 2690 MHz | TDD |
| n91 | 832 MHz – 862 MHz | 1427 MHz – 1432 MHz | FDD(NOTE 2) |
| n92 | 832 MHz – 862 MHz | 1432 MHz – 1517 MHz | FDD (NOTE 2) |
| n93 | 880 MHz – 915 MHz | 1427 MHz – 1432 MHz | FDD(NOTE 2) |
| n94 | 880 MHz – 915 MHz | 1432 MHz – 1517 MHz | FDD(NOTE 2) |
| n95 (NOTE 1) | 2010 MHz – 2025 MHz | N/A | SUL  |
| n96 (NOTE 4) | 5925 MHz – 7125 MHz | 5925 MHz – 7125 MHz | TDD(NOTE 3) |
| n975 | 2300 MHz – 2400 MHz | N/A | SUL  |
| n985 | 1880 MHz – 1920 MHz | N/A | SUL  |
| n996 | 1626.5 MHz -1660.5 MHz | N/A | SUL |
| n100 | 874.4 MHz – 880 MHz | 919.4 MHz – 925 MHz | FDD |
| n101 | 1900 MHz – 1910 MHz | 1900 MHz – 1910 MHz | TDD |
| n1024 | 5925 MHz – 6425 MHz | 5925 MHz – 6425 MHz | TDD3 |
| n1048 | 6425 MHz – 7125 MHz | 6425 MHz – 7125 MHz | TDD |
| NOTE 1: This band is applicable in China only.NOTE 2: Variable duplex operation does not enable dynamic variable duplex configuration by the network, and is used such that DL and UL frequency ranges are supported independently in any valid frequency range for the band.NOTE 3: This band is restricted to operation with shared spectrum channel access as defined in TS 37.213 [20].NOTE 4: This band is applicable only in countries/regions designating this band for shared-spectrum access use subject to country-specific conditions.NOTE 5: The requirements for this band are applicable only where no other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area. For scenarios where other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications. NOTE 6: UL operation is restricted to 1627.5 – 1637.5 MHz and 1646.5 – 1656.5 MHz per FCC Order DA 20-48. NOTE 7: DL operation is restricted to 1526-1536 MHz frequency range. UL operation is restricted to 1627.5 – 1637.5 MHz and 1646.5 – 1656.5 MHz per FCC Order 20-51 [24]NOTE 8: [This band is applicable only in countries/regions designating this band for IMT licensed operation in accordance with RCC Recommendation 1/21.] |

Table 5.2-2: NR *operating bands* in FR2

|  |  |  |
| --- | --- | --- |
| NR *operating band* | Uplink (UL) and Downlink (DL) *operating band*BS transmit/receiveUE transmit/receiveFUL,low – FUL,highFDL,low – FDL,high | Duplex mode |
| n257 | 26500 MHz – 29500 MHz | TDD |
| n258 | 24250 MHz – 27500 MHz | TDD |
| n259 | 39500 MHz – 43500 MHz | TDD |
| n260 | 37000 MHz – 40000 MHz | TDD |
| n261 | 27500 MHz – 28350 MHz | TDD |
| n262 | 47200 MHz – 48200 MHz | TDD |
| n263 | 57000 MHz – 71000 MHz | TDD |

## 5.3 *BS channel bandwidth*

### 5.3.1 General

The *BS channel bandwidth* supports a single NR RF carrier in the uplink or downlink at the Base Station. Different UE channel bandwidths may be supported within the same spectrum for transmitting to and receiving from UEs connected to the BS. The placement of the UE channel bandwidth is flexible but can only be completely within the *BS channel bandwidth*. The BS shall be able to transmit to and/or receive from one or more UE bandwidth parts that are smaller than or equal to the number of carrier resource blocks on the RF carrier, in any part of the carrier resource blocks.

The relationship between the channel bandwidth, the guardband and the *transmission bandwidth configuration* is shown in figure 5.3.1-1.

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Figure 5.3.1-1: Definition of channel bandwidth and *transmission bandwidth configuration* for one NR channel

### 5.3.2 *Transmission bandwidth configuration*

The *transmission bandwidth configuration* NRB for each *BS channel bandwidth* and subcarrier spacing is specified in table 5.3.2.-1 for FR1 and table 5.3.2-2 for FR2.

Table 5.3.2-1: *Transmission bandwidth configuration* NRB for FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 5MHz | 10MHz | 15MHz | 20 MHz | 25 MHz | 30MHz | 35MHz | 40 MHz | 45 MHz | 50 MHz | 60 MHz | 70MHz | 80 MHz | 90MHz | 100 MHz |
|  | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB | NRB |
| 15 | 25 | 52 | 79 | 106 | 133 | 160 | 188 | 216 | 242 | 270 | N/A | N/A | N/A | N/A | N/A |
| 30 | 11 | 24 | 38 | 51 | 65 | 78 | 92 | 106 | 119 | 133 | 162 | 189 | 217 | 245 | 273 |
| 60 | N/A | 11 | 18 | 24 | 31 | 38 | 44 | 51 | 58 | 65 | 79 | 93 | 107 | 121 | 135 |

Table 5.3.2-2: *Transmission bandwidth configuration* NRB for FR2-1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCS (kHz) | 50 MHz | 100 MHz | 200 MHz | 400 MHz |
|  | NRB | NRB | NRB | NRB |
| 60 | 66 | 132 | 264 | N/A |
| 120 | 32 | 66 | 132 | 264 |

Table 5.3.2-3: Transmission bandwidth configuration NRB for FR2-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 100 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
|  | NRB | NRB | NRB | NRB | NRB |
| 120 | 66 | 264 | N/A | N/A | N/A |
| 480 | N/A | 66 | 124 | 248 | N/A |
| 960 | N/A | 33 | 62 | 124 | 148 |

NOTE: All Tx and Rx requirements are defined based on *transmission bandwidth configuration* specified in table 5.3.2-1 for FR1 and table 5.3.2-2 and table 5.3.2-3 for FR2.

The transmission bandwidth configuration for NB-IoT is specified in TS 36.104 [13] clause 5.6.

### 5.3.3 Minimum guardband and *transmission bandwidth configuration*

The minimum guardband for each *BS channel bandwidth* and SCS is specified in table 5.3.3-1 for FR1 and in table 5.3.3-2 and table 5.3.3-2a for FR2.

Table 5.3.3-1: Minimum guardband (kHz) (FR1)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 5MHz | 10MHz | 15MHz | 20MHz | 25MHz | 30MHz | 35MHz | 40MHz | 45MHz | 50MHz | 60MHz | 70MHz | 80MHz | 90MHz | 100MHz |
| 15 | 242.5 | 312.5 | 382.5 | 452.5 | 522.5 | 592.5 | 572.5 | 552.5 | 712.5 | 692.5 | N/A | N/A | N/A | N/A | N/A |
| 30 | 505 | 665 | 645 | 805 | 785 | 945 | 925 | 905 | 1065 | 1045 | 825 | 965 | 925 | 885 | 845 |
| 60 | N/A | 1010 | 990 | 1330 | 1310 | 1290 | 1630 | 1610 | 1590 | 1570 | 1530 | 1490 | 1450 | 1410 | 1370 |

Table 5.3.3-2: Minimum guardband (kHz) (FR2-1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCS (kHz) | 50 MHz | 100 MHz | 200 MHz | 400 MHz |
| 60 | 1210 | 2450 | 4930 | N/A |
| 120 | 1900 | 2420 | 4900 | 9860 |

Table 5.3.3-2a: Minimum guardband (kHz) (FR2-2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 100 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
| 120 | 2480 | 9920 | N/A | N/A | N/A |
| 480 | N/A | 9680 | 42640 | 85520 | N/A |
| 960 | N/A | 9440 | [42400] | 85280 | 147040 |

The minimum guardband of SCS 240 kHz SS/PBCH block for each *BS channel bandwidth* is specified in table 5.3.3-3 for FR2.

Table 5.3.3-3: Minimum guardband (kHz) of SCS 240 kHz SS/PBCH block (FR2)

|  |  |  |  |
| --- | --- | --- | --- |
| SCS (kHz) | 100 MHz | 200 MHz | 400 MHz |
| 240 | 3800 | 7720 | 15560 |

NOTE: The minimum guardband in Table 5.3.3-3 is applicable only when the SCS 240 kHz SS/PBCH block is placed adjacent to the edge of the *BS channel bandwidth* within which the SS/PBCH block is located.

The number of RBs configured in any *BS channel bandwidth* shall ensure that the minimum guardband specified in this clause is met.



Figure 5.3.3-1: BS PRB utilization

In the case that multiple numerologies are multiplexed in the same symbol, the minimum guardband on each side of the carrier is the guardband applied at the configured *BS channel bandwidth* for the numerology that is transmitted/received immediately adjacent to the guard band.

For FR1, if multiple numerologies are multiplexed in the same symbol and the *BS channel bandwidth* is >50 MHz, the guardband applied adjacent to 15 kHz SCS shall be the same as the guardband defined for 30 kHz SCS for the same *BS channel bandwidth*.

For FR2, if multiple numerologies are multiplexed in the same symbol and the *BS channel bandwidth* is >200 MHz, the guardband applied adjacent to 60 kHz SCS shall be the same as the guardband defined for 120 kHz SCS for the same *BS channel bandwidth*.



Figure 5.3.3-2: Guard band definition when transmitting multiple numerologies

NOTE: Figure 5.3.3-2 is not intended to imply the size of any guard between the two numerologies. Inter-numerology guard band within the carrier is implementation dependent.

Figure 5.3.3-3: Void

Figure 5.3.3-4: Void

Figure 5.3.3-5: Void

### 5.3.4 RB alignment

For each *BS channel bandwidth* and each numerology, *BS transmission bandwidth configuration* must fulfil the minimum guardband requirement specified in clause 5.3.3.

For each numerology, its common resource blocks are specified in clause 4.4.4.3 in [9], and the starting point of its *transmission bandwidth configuration* on the common resource block grid for a given channel bandwidth is indicated by an offset to “Reference point A” in the unit of the numerology.

For each numerology, all *UE transmission bandwidth configurations* indicated to UEs served by the BS by higher layer parameter *carrierBandwidth* defined in TS 38.331 [11] shall fall within the *BS transmission bandwidth configuration*.

### 5.3.5 *BS channel bandwidth* per *operating band*

The requirements in this specification apply to the combination of *BS channel bandwidths*, SCS and *operating bands* shown in table 5.3.5-1 for FR1 and in table 5.3.5-2 and 5.3.5-3 for FR2. The *transmission bandwidth configuration* in table 5.3.2-1, table 5.3.2-2 and table 5.3.2-3 shall be supported for each of the *BS channel bandwidths* within the BS capability. The *BS channel bandwidths* are specified for both the Tx and Rx path.

Table 5.3.5-1: *BS channel bandwidths* and SCS per *operating band* in FR2-1

| NR Band | SCS (kHz) | *BS channel bandwidth* (MHz) |
| --- | --- | --- |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 45 | 50 |  |  |  |  |  |
| n1 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 45 | 50 |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 45 | 50 |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
| n2 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
| n3 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 257 |  |  |  |  |  |  |  |  |  |  |
| n5 | 30 |  | 10 | 15 | 20 | 257 |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  | 50 |  |  |  |  |  |
| n7 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  | 50 |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  | 50 |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  | 35 |  |  |  |  |  |  |  |  |
| n8 | 30 |  | 10 | 15 | 20 |  |  | 35 |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n12 | 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n13 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n14 | 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n18 | 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n20 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n24 | 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
| n25 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
| n26 | 15 | 5 | 10 | 15 | 20 | 257 | 307 |  |  |  |  |  |  |  |  |  |
|  | 30 |  | 10 | 15 | 20 | 257 | 307 |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n28 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n29 | 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n34 | 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n38 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n39 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 15 | 54 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n40 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
| n41 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 |  | 106 |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| n46 | 30 |  | 106 |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
|  | 60 |  | 106 |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
|  | 15 | 52 | 10 | 15 | 20 |  | 30 |  | 40 |  | 501 |  |  |  |  |  |
| n48 | 30 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 501 | 601 | 701 | 801 | 901 | 1001 |
|  | 60 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 501 | 601 | 701 | 801 | 901 | 1001 |
|  | 15 | 52 | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n50 | 30 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 |  |  |
|  | 60 |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 80 |  |  |
|  | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n51 | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n53 | 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  | 50 |  |  |  |  |  |
| n65 | 30 |  | 10 | 15 | 20 |  |  |  |  |  | 50 |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 |  |  |  |  |  | 50 |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
| n66 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n67 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 |  |  |  |  |  |  |  |  |  |  |
| n70 | 30 |  | 10 | 15 | 20 | 25 |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 |  |  |  |  |  |  |  |  |
| n71 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n74 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n75 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n76 | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 |  | 10 | 15  | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n77 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n78 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 |  | 10 |  | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n79 | 30 |  | 10 |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  | 10 |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n80 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n81 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n82 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n83 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n84 | 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n85 | 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| n86 | 30 |  | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n89 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
| n90 | 30 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 | 5 | 103 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n91 | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n92 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 103 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n93 | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n94 | 30 |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n95 | 30 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 |  |  |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| n96 | 30 |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
|  | 60 |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
| n97 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n98 | 15 | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 30 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| 60 |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n99 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n100 | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n101 | 15 | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 15 |  |  |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| n102 | 30 |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
|  | 60 |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  |  |
|  | 15 |  |  |  | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n104 | 30 |  |  |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| NOTE 1: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an downlink SCell part of CA configuration.NOTE 2: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.NOTE 3: For this bandwidth, it only applies for UL transmission.NOTE 4: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.NOTE 5: Void.NOTE 6: This bandwidth can only be applied in certain regions where the absence of non 3GPP technologies can be guaranteed on a long term basis in this version of specification.NOTE 7: For this bandwidth, it only applies for DL transmission. |

Table 5.3.5-2: *BS channel bandwidths* and SCS per *operating band* in FR2

|  |  |  |
| --- | --- | --- |
| NR Band | SCS(kHz) | *BS channel bandwidth* (MHz) |
| 50 | 100 | 200 | 400 |
| n257 | 60 | 50 | 100 | 200 |  |
|  | 120 | 50 | 100 | 200 | 400 |
| n258 | 60 | 50 | 100 | 200 |  |
|  | 120 | 50 | 100 | 200 | 400 |
| n259 | 60 | 50 | 100 | 200 |  |
|  | 120 | 50 | 100 | 200 | 400 |
| n260 | 60 | 50 | 100 | 200 |  |
|  | 120 | 50 | 100 | 200 | 400 |
| n261 | 60 | 50 | 100 | 200 |  |
|  | 120 | 50 | 100 | 200 | 400 |
| n262 | 60 | 50 | 100 | 200 |  |
|  | 120 | 50 | 100 | 200 | 400 |

Table 5.3.5-3: *BS channel bandwidths* and SCS per *operating band* in FR2-2

|  |  |
| --- | --- |
|  | *BS channel bandwidth* (MHz) |
| NR Band | SCS(kHz) | 100 | 400 | 800 | 1600 | 2000 |
| n263 | 120 | 100 | 400 |  |  |  |
|  | 480 |  | 400 | 800 | 1600 |  |
|  | 960 |  | 400 | 800 | 1600 | 2000 |

## 5.3A *BS channel bandwidth* for CA

### 5.3A.1 *Transmission bandwidth configuration* for CA

For *carrier aggregation*, the *transmission bandwidth configuration* is defined per component carrier and the requirement is specified in clause 5.3.2.

### 5.3A.2 Minimum guardband and *transmission bandwidth configuration* for CA

For intra-band contiguous *carrier aggregation*, *Aggregated BS Channel Bandwidth* and *Guard Bands* are defined as follows, see Figure 5.3A.2-1.

**FC\_low**

**Lower Edge**

**Upper Edge**

**Lowest Carrier Transmission Bandwidth Configuration [RB]**

**FC\_high**

**Foffset\_low**

**Highest Carrier Transmission Bandwidth Configuration [RB]**

**Resource block**

***Aggregated BS Channel Bandwidth*, BWchannel\_CA [MHz]**

**Fedge\_low**

**Fedge\_high**

**Foffset\_high**

Figure 5.3A.2-1: Definition of *Aggregated BS Channel Bandwidth* for intra-band *carrier aggregation*

The *aggregated BS Channel Bandwidth*, BWChannel\_CA**,** is defined as

 BWChannel\_CA = Fedge,high - Fedge,low (MHz)

The lower bandwidth edge Fedge, low and the upper bandwidth edge Fedge,high of the *aggregated BS channel bandwidth* are used as frequency reference points for transmitter and receiver requirements and are defined by

 Fedge,low = FC,low - Foffset,low

 Fedge,high = FC,high + Foffset,high

The lower and upper frequency offsets depend on the *transmission bandwidth configurations* of the lowest and highest assigned edge component carrier and are defined as

Foffset,low = (NRB,low\*12 + 1)\*SCSlow/2 + BWGB,low (MHz)

Foffset,high = (NRB,high\*12 - 1)\*SCShigh/2 + BWGB,high (MHz)

NRB,low and NRB,high are the *transmission bandwidth configurations* according to Table 5.3.2-1 or Table 5.3.2-2 or Table 5.3.2-3 for the lowest and highest assigned component carrier, SCSlow and SCShigh are the sub-carrier spacing for the lowest and highest assigned component carrier respectively. SCSlow, SCShigh, NRB,low, NRB,high, BWGB,low and BWGB,high use the largest μ value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and BWGB,low and BWGB,high are the minimum guard band for lowest and highest assigned component carrier according to Table 5.3.3-1 for the said *μ* value. In case there is no common μ value for both of the channel bandwidths, *μ*=1 is used for SCSlow, SCShigh, NRB,low, NRB,high, BWGB,low and BWGB,high.

For *intra-band non-contiguous carrier aggregation* *sub-block bandwidth* and *sub-block edges* are defined as follows, see figure 5.3A.2-2.

FC,block 1,low

**Sub-block Bandwidth, BWChannel,block[MHz]**

**Fedge,block 1, low**

**Fedge,block n, low**

**FC,block n,high**

**FC,block 1,high**

Sub block n

Sub block 1

Base Station RF Bandwidth

**Transmission Bandwidth Configuration of the highest carrier in a sub-block [RB]**

**Transmission Bandwidth Configuration of the lowest carrier in a sub-block [RB]**

**Transmission Bandwidth Configuration of the highest carrier in a sub-block [RB]**

**Fedge,block 1,high**

**Upper Sub-block Edge**

**Lower Sub-block Edge**

**Lower Sub-block Edge**

**Foffset\_high**

**Fedge,block n,high**

**Sub-block Bandwidth, BWChannel,block [MHz]**

**Resource block**

**Foffset\_low**

**FC,block n,low**

**Upper Sub-block Edge**

**Foffset\_high**

**Resource block**

**Foffset\_low**

**Transmission Bandwidth Configuration of the lowest carrier in a sub-block [RB]**

...

Figure 5.3A.2-2: Definition of *sub-block bandwidth* for intra-band *non-contiguous spectrum*

The *lower sub-block edge* of the *sub-block bandwidth* (BWChannel,block) is defined as follows:

 Fedge,block, low = FC,block,low - Foffset,low

The upper *sub-block* edge of the *sub-block bandwidth* is defined as follows:

 Fedge,block,high = FC,block,high + Foffset,high

The *sub-block bandwidth*, BWChannel,block, is defined as follows:

 BWChannel,block = Fedge,block,high - Fedge,block,low (MHz)

The lower and upper frequency offsets Foffset,block,low and Foffset,block,high depend on the *transmission bandwidth configurations* of the lowest and highest assigned edge component carriers within a *sub-block* and are defined as

 Foffset,block,low = (NRB,low\*12 + 1)\*SCSlow/2 + BWGB,low (MHz)

 Foffset,block,high = (NRB,high\*12 - 1)\*SCShigh/2 + BWGB,high (MHz)

where NRB,low and NRB,high are the *transmission bandwidth configurations* according to Table 5.3.2-1 or Table 5.3.2-2 for the lowest and highest assigned component carrier within a *sub-block*, respectively. SCSlow and SCShigh are the sub-carrier spacing for the lowest and highest assigned component carrier within a *sub-block*, respectively. SCSlow, SCShigh, NRB,low, NRB,high, BWGB,low and BWGB,high use the largest μ value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and BWGB,low and BWGB,high are the minimum guard band for lowest and highest assigned component carrier according to Table 5.3.3-1 for the said *μ* value. In case there is no common μ value for both of the channel bandwidths, *μ*=1 is used for SCSlow, SCShigh, NRB,low, NRB,high, BWGB,low and BWGB,high.

The *sub-block gap size* between two consecutive *sub-blocks* Wgap is defined as follows:

 Wgap = Fedge,block n+1,low - Fedge,block n,high (MHz)

## 5.4 Channel arrangement

### 5.4.1 Channel spacing

#### 5.4.1.1 Channel spacing for adjacent NR carriers

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the *BS channel bandwidths*. The nominal channel spacing between two adjacent NR carriers is defined as following:

- For NR FR1 *operating bands* with 100 kHz channel raster,

▪ Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2

- For NR FR1 *operating bands* with 15 kHz channel raster,

▪ Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2 + {-5 kHz, 0 kHz, 5 kHz} for ∆FRaster equals to 15 kHz

▪ Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2 + {-10 kHz, 0 kHz, 10 kHz} for ∆FRaster equals to 30 kHz

- For NR FR2 *operating bands* with 60 kHz channel raster,

▪ Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2 + {-20 kHz, 0 kHz, 20 kHz} for ∆FRaster equals to 60 kHz

▪ Nominal Channel spacing = (BWChannel(1) + BWChannel(2))/2 + {-40 kHz, 0 kHz, 40 kHz} for ∆FRaster equals to 120 kHz

* For operating band n263

▪ Nominal Channel spacing = ceil((BWChannel(1) + BWChannel(2))/100.8)\*50.4 MHz,

where BWChannel(1) and BWChannel(2) are the *BS channel bandwidths* of the two respective NR carriers. The channel spacing can be adjusted depending on the channel raster to optimize performance in a particular deployment scenario.

#### 5.4.1.2 Channel spacing for CA

For intra-band contiguously aggregated carriers, the channel spacing between adjacent component carriers shall be multiple of least common multiple of channel raster and sub-carrier spacing.

The nominal channel spacing between two adjacent aggregated NR carriers is defined as follows:

For NR *operating bands* with 100 kHz channel raster:

For NR *operating bands* with 15 kHz channel raster:

with

For NR *operating bands* with 60kHz channel raster:

with

For operating band n263

Nominal Channel spacing = ceil((BWChannel(1) + BWChannel(2))/100.8)\*50.4 MHz,

where BWChannel(1) and BWChannel(2) are the *BS channel bandwidths* of the two respective NR component carriers according to Table 5.3.2-1, 5.3.2-2 and 5.3.2-3 with values in MHz, the largest value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and Table 5.3.5-2 and *GBChannel(i)* the minimum guard band for channel bandwidth *i* according to Table 5.3.3-1, Table 5.3.3-2 and Table 5.3.3-2a for the said value, with as defined in TS 38.211 [9]. In case there is no common μ value for both of the channel bandwidths, μ0=1 is selected for NR *operating bands* with 15 kHz channel raster and *GBChannel(i)* is the minimum guard band for channel bandwidth i according to Table 5.3.3-1 for *μ*=1 with *μ* as defined in TS 38.211[9].

The channel spacing for *intra-band contiguous carrier aggregation* can be adjusted to any multiple of least common multiple of channel raster and sub-carrier spacing less than the nominal channel spacing to optimize performance in a particular deployment scenario.

For *intra-band non-contiguous carrier aggregation*, the channel spacing between two NR component carriers in different *sub-blocks* shall be larger than the nominal channel spacing defined in this clause.

### 5.4.2 Channel raster

#### 5.4.2.1 NR-ARFCN and channel raster

The global frequency raster defines a set of *RF reference frequencies* FREF. The *RF reference frequency* is used in signalling to identify the position of RF channels, SS blocks and other elements. The global frequency raster is defined for all frequencies from 0 to 100 GHz. The granularity of the global frequency raster is ΔFGlobal.

*RF reference frequencies* are designated by an NR Absolute Radio Frequency Channel Number (NR-ARFCN) in the range [0…3279165] on the global frequency raster. The relation between the NR-ARFCN and the *RF reference frequency* FREF in MHz is given by the following equation, where FREF-Offs and NRef-Offs are given in table 5.4.2.1-1 and NREF is the NR-ARFCN.

 FREF = FREF-Offs + ΔFGlobal (NREF – NREF-Offs)

Table 5.4.2.1-1: NR-ARFCN parameters for the global frequency raster

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Range of frequencies (MHz) | ΔFGlobal (kHz) | FREF-Offs (MHz) | NREF-Offs | Range of NREF |
| 0 – 3000 | 5 | 0 | 0 | 0 – 599999 |
| 3000 – 24250 | 15 | 3000 | 600000 | 600000 – 2016666 |
| 24250 – 100000 | 60 | 24250.08 | 2016667 | 2016667 – 3279165 |

The *channel raster* defines a subset of *RF reference frequencies* that can be used to identify the RF channel position in the uplink and downlink. The *RF reference frequency* for an RF channel maps to a resource element on the carrier. For each *operating band*, a subset of frequencies from the global frequency raster are applicable for that band and forms a channel raster with a granularity ΔFRaster, which may be equal to or larger than ΔFGlobal.

For SUL bands except n95, n97, n98 and for the uplink of all FDD bands defined in table 5.2-1, for TDD bands n34, n38, n39, n48, n90, and n40,

 FREF,shift = FREF + Δshift, where Δshift = 0 kHz or 7.5 kHz

where Δshift is signalled by the network in higher layer parameter *frequencyShift7p5khz* as defined in TS 38.331 [11].

For bands n34, n38, n39, n48 and n40, FREF, shift is only applicable to uplink transmissions using a 15 kHz SCS.

The mapping between the *channel raster* and corresponding resource element is given in clause 5.4.2.2. The applicable entries for each *operating band* are defined in clause 5.4.2.3.

#### 5.4.2.1A NB-IoT carrier frequency numbering

The NB-IoT carrier frequency numbering (EARFCN) is defined in clause 5.7 of TS 36.104 [4].

#### 5.4.2.2 Channel raster to resource element mapping

The mapping between the *RF reference frequency* on the channel raster and the corresponding resource element is given in table 5.4.2.2-1 and can be used to identify the RF channel position. The mapping depends on the total number of RBs that are allocated in the channel and applies to both UL and DL. The mapping must apply to at least one numerology supported by the BS.

Table 5.4.2.2-1: Channel Raster to Resource Element Mapping

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Resource element index  | 0 | 6 |
| Physical resource block number  |  |  |

k,  and NRB are as defined in TS 38.211 [9].

#### 5.4.2.3 Channel raster entries for each *operating band*

The RF channel positions on the channel raster in each NR *operating band* are given through the applicable NR-ARFCN in table 5.4.2.3-1 for FR1 and table 5.4.2.3-2 for FR2, using the channel raster to resource element mapping in clause 5.4.2.2.

- For NR *operating bands* with 100 kHz channel raster, ΔFRaster = 20 × ΔFGlobal. In this case, every 20th NR-ARFCN within the *operating band* are applicable for the channel raster within the *operating band* and the step size for the channel raster in table 5.4.2.3-1 is given as <20>.

- For NR *operating bands* with 15 kHz channel raster below 3 GHz, ΔFRaster = *I* × ΔFGlobal, where *I* ϵ {3,6}. In this case, every *Ith* NR‑ARFCN within the *operating band* are applicable for the channel raster within the *operating band* and the step size for the channel raster in table 5.4.2.3-1 is given as <*I*>.

- For NR *operating bands* with 15 kHz and 60 kHz channel raster above 3 GHz, ΔFRaster = *I* ×ΔFGlobal, where *I* ϵ {1, 2}. In this case, every *Ith* NR‑ARFCN within the *operating band* are applicable for the channel raster within the *operating band* and the step size for the channel raster in table 5.4.2.3-1 and table 5.4.2.3-2 is given as <*I*>.

- For frequency bands with two ΔFRaster in FR1, the higher ΔFRaster applies to channels using only the SCS that is equal to or larger than the higher ΔFRaster and SSB SCS is equal to the higher ΔFRaster.

- For frequency bands with two ΔFRaster in FR2, the higher ΔFRaster applies to channels using only the SCS that is equal to the higher ΔFRaster and the SSB SCS that is equal to or larger than the higher ΔFRaster.

Table 5.4.2.3-1: Applicable NR-ARFCN per *operating band* in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | ΔFRaster(kHz)  | Uplinkrange of NREF(First – <Step size> – Last) | Downlinkrange of NREF(First – <Step size> – Last) |
| n1 | 100 | 384000 – <20> – 396000 | 422000 – <20> – 434000 |
| n2 | 100 | 370000 – <20> – 382000 | 386000 – <20> – 398000 |
| n3 | 100 | 342000 – <20> – 357000 | 361000 – <20> – 376000 |
| n5 | 100 | 164800 – <20> – 169800 | 173800 – <20> – 178800 |
| n7 | 100 | 500000 – <20> – 514000 | 524000 – <20> – 538000 |
| n8 | 100 | 176000 – <20> – 183000 | 185000 – <20> – 192000 |
| n12 | 100 | 139800 – <20> – 143200 | 145800 – <20> – 149200 |
| n13 | 100 | 155400 – <20> – 157400 | 149200 – <20> – 151200 |
| n14 | 100 | 157600 – <20> –159600 | 151600 – <20> – 153600 |
| n18 | 100 | 163000 – <20> – 166000 | 172000 – <20> – 175000 |
| n20 | 100 | 166400 – <20> – 172400 | 158200 – <20> – 164200 |
| n25 | 100 | 370000 – <20> – 383000 | 386000 – <20> – 399000 |
| n24 | 100 | 325300 – <20> – 332100 | 305000 – <20> – 311800 |
| n26 | 100 | 162800 – <20> – 169800 | 171800 – <20> – 178800 |
| n28 | 100 | 140600 – <20> – 149600 | 151600 – <20> – 160600 |
| n29 | 100 | N/A | 143400 – <20> – 145600 |
| n30 | 100 | 461000 – <20> – 463000 | 470000 – <20> – 472000 |
| n34 | 100 | 402000 – <20> – 405000 | 402000 – <20> – 405000 |
| n38 | 100 | 514000 – <20> – 524000 | 514000 – <20> – 524000 |
| n39 | 100 | 376000 – <20> – 384000 | 376000 – <20> – 384000 |
| n40 | 100 | 460000 – <20> – 480000 | 460000 – <20> – 480000 |
| n41 | 15 | 499200 – <3> – 537999 | 499200 – <3> – 537999 |
|  | 30 | 499200 – <6> – 537996 | 499200 – <6> – 537996 |
| n461 | 15 | 743334 – <1> – 795000 | 743334 – <1> – 795000 |
| n48 | 15 | 636667 – <1> – 646666 | 636667 – <1> – 646666 |
|  | 30 | 636668 – <2> – 646666 | 636668 – <2> – 646666 |
| n50 | 100 | 286400 – <20> – 303400 | 286400 – <20> – 303400 |
| n51 | 100 | 285400 – <20> – 286400 | 285400 – <20> – 286400 |
| n53 | 100 | 496700 – <20> – 499000 | 496700 – <20> – 499000 |
| n65 | 100 | 384000 – <20> – 402000 | 422000 – <20> – 440000 |
| n66 | 100 | 342000 – <20> – 356000 | 422000 – <20> – 440000 |
| n67 | 100 | N/A | 147600 – <20> – 151600 |
| n70 | 100 | 339000 – <20> – 342000 | 399000 – <20> – 404000 |
| n71 | 100 | 132600 – <20> – 139600 | 123400 – <20> – 130400 |
| n74 | 100 | 285400 – <20> – 294000 | 295000 – <20> – 303600 |
| n75 | 100 | N/A | 286400 – <20> – 303400 |
| n76 | 100 | N/A | 285400 – <20> – 286400 |
| n77 | 15 | 620000 – <1> – 680000 | 620000 – <1> – 680000 |
|  | 30 | 620000 – <2> – 680000 | 620000 – <2> – 680000 |
| n78 | 15 | 620000 – <1> – 653333 | 620000 – <1> – 653333 |
|  | 30 | 620000 – <2> – 653332 | 620000 – <2> – 653332 |
| n79 | 15 | 693334 – <1> – 733333 | 693334 – <1> – 733333 |
|  | 30 | 693334 – <2> – 733332 | 693334 – <2> – 733332 |
| n80 | 100 | 342000 – <20> – 357000 | N/A |
| n81 | 100 | 176000 – <20> – 183000 | N/A |
| n82 | 100 | 166400 – <20> – 172400  | N/A |
| n83 | 100 | 140600 – <20> –149600 | N/A |
| n84 | 100 | 384000 – <20> – 396000 | N/A |
| n85 | 100 | 139600 – <20> – 143200 | 145600 – <20> – 149200 |
| n86 | 100 | 342000 – <20> – 356000 | N/A |
| n89 | 100 | 164800 – <20> – 169800 | N/A |
|  | 15 | 499200 – <3> – 537999 | 499200 – <3> – 537999 |
| n90 | 30 | 499200 – <6> – 537996 | 499200 – <6> – 537996 |
|  | 100 | 499200 – <20> – 538000 | 499200 – <20> – 538000 |
| n91 | 100 | 166400 – <20> – 172400 | 285400 – <20> – 286400 |
| n92 | 100 | 166400 – <20> – 172400 | 286400 – <20> – 303400 |
| n93 | 100 | 176000 – <20> – 183000 | 285400 – <20> – 286400 |
| n94 | 100 | 176000 – <20> – 183000 | 286400 – <20> – 303400 |
| n95 | 100 | 402000 – <20> – 405000 | N/A |
| n962 | 15 | 795000 – <1> – 875000 | 795000 – <1> – 875000 |
| n97 | 100 | 460000 – <20> – 480000 | N/A |
| n98 | 100 | 376000 – <20> – 384000 | N/A |
| n99 | 100 | 325300 -- <20> – 332100 | N/A |
| n100 | 100 | 174880 – <20> – 176000 | 183880 – <20> – 185000 |
| n101 | 100 | 380000 – <20> – 382000 | 380000 – <20> – 382000 |
| n1023 | 15 | 796334 – <1> – 828333 | 796334 – <1> – 828333 |
| n104 | 15 | 828334 – <1> – 875000 | 828334 – <1> – 875000 |
|  | 30 | 828334 – <2> – 875000 | 828334 – <2> – 875000 |
| NOTE 1: Applicable NR-ARFCN for band n46 for 10 MHz channel bandwidth, NREF = {782000, 788668} for 20 MHz channel bandwidth, NREF = {744000, 745332, 746668, 748000, 749332, 750668, 752000, 753332, 754668, 756000, 765332, 766668, 768000, 769332, 770668, 772000, 773332, 774668, 776000, 777332, 778668, 780000, 781332, 783000, 784332, 785668, 787000, 788332, 789668, 791000, 792332, 793668}; for 40 MHz channel bandwidth, NREF = {744668, 746000, 748668, 751332, 754000, 755332, 766000, 767332, 770000, 772668, 775332, 778000, 780668, 783668, 786332, 787668, 790332, 793000}; for 60 MHz channel bandwidth, NREF = {745332, 746668, 748000, 752000, 753332, 754668, 766668, 768000, 769332, 773332, 774668, 778668, 780000, 784332, 785668, 791000, 792332}; for 80 MHz channel bandwidth, NREF = {746000, 747332, 752668, 754000, 767332, 768668, 774000, 779332, 785000, 791668} for 100 MHz channel bandwidth, NREF = {746668, 753332, 768000, 791000}NOTE 2: Applicable NR-ARFCN for band n96 for 20 MHz channel bandwidth, NREF = {797000, 798332, 799668, 801000, 802332, 803668, 805000, 806332, 807668, 809000, 810332, 811668, 813000, 814332, 815668, 817000, 818332, 819668, 821000, 822332, 823668, 825000, 826332, 827668, 829000, 830332, 831668, 833000, 834332, 835668, 837000, 838332, 839668, 841000, 842332, 843668, 845000, 846332, 847668, 849000, 850332, 851668, 853000, 854332, 855668, 857000, 858332, 859668, 861000, 862332, 863668, 865000, 866332, 867668, 869000, 870332, 871668, 873000, 874332} for 40 MHz channel bandwidth, NREF = {797668, 800332, 803000, 805668, 808332, 811000, 813668, 816332, 819000, 821668, 824332, 827000, 829668, 832332, 835000, 837668, 840332, 843000, 845668, 848332, 851000, 853668, 856332, 859000, 861668, 864332, 867000, 869668, 872332} for 60 MHz channel bandwidth, NREF = {798332, 799668, 803668, 805000, 809000, 810332, 814332, 815668, 819668, 821000, 825000, 826332, 830332, 831668, 835668, 837000, 841000, 842332, 846332, 847668, 851668, 853000, 857000, 858332, 862332, 863668, 867668, 869000, 873000} for 80 MHz channel bandwidth, NREF = {799000, 804332, 809668, 815000, 820332, 825668, 831000, 836332, 841668, 847000, 852332, 857668, 863000, 868332} for 100 MHz channel bandwidth, NREF = {799668, 803668, 810332, 814332, 821000, 825000, 831668, 835668, 842332, 846332, 853000, 857000, 863668, 867668, 869000, 870332, 871668}NOTE 3: Applicable NR-ARFCN for band n102 for 20 MHz channel bandwidth, NREF = {795668, 797000, 798332, 799668, 801000, 802332, 803668, 805000, 806332, 807668, 809000, 810332, 811668, 813000, 814332, 815668, 817000, 818332, 819668, 821000, 822332, 823668, 825000, 826332, 827668} for 40 MHz channel bandwidth, NREF = {797668, 800332, 803000, 805668, 808332, 811000, 813668, 816332, 819000, 821668, 824332, 827000} for 60 MHz channel bandwidth, NREF = {798332, 799668, 803668, 805000, 809000, 810332, 814332, 815668, 819668, 821000, 825000, 826332} for 80 MHz channel bandwidth, NREF = {799000, 804332, 809668, 815000, 820332, 825668} for 100 MHz channel bandwidth, NREF = {799668, 803668, 810332, 814332, 821000, 825000} |

Table 5.4.2.3-2: Applicable NR-ARFCN per *operating band* in FR2

|  |  |  |
| --- | --- | --- |
| NR *operating band* | ΔFRaster(kHz)  | Uplink and Downlinkrange of NREF(First – <Step size> – Last) |
| n257 | 60 | 2054166 – <1> – 2104165 |
|  | 120 | 2054167 – <2> – 2104165 |
| n258 | 60 | 2016667 – <1> – 2070832 |
|  | 120 | 2016667 – <2> – 2070831 |
| n259 | 60 | 2270833 – <1> – 2337499 |
|  | 120 | 2270833 – <2> – 2337499 |
| n260 | 60 | 2229166 – <1> – 2279165 |
|  | 120 | 2229167 – <2> – 2279165 |
| n261 | 60 | 2070833 – <1> – 2084999 |
|  | 120 | 2070833 – <2> – 2084999 |
| n262 | 60 | 2399166 – <1> – 2415832 |
|  | 120 | 2399167 – <2> – 2415831 |
| n263 | 120 | See Table 5.4.2.3-2 |
|  | 480 |  |
|  | 960 |  |

Table 5.4.2.3-3: Applicable NR-ARFCN for operation in band n263

|  |  |
| --- | --- |
| Channel Bandwidth | Applicable NR-ARFCN |
| 100 MHz | 2564083 + 1680 \* N, N = 0:137 |
| 400 MHz | 2566603 + 6720 \* N, N = 0:33 |
| 800 MHz | 2569963 + 6720 \* N, N = 0:32 |
| 1600 MHz | 2576683 + 6720 \* N, N =0:30 |
| 2000 MHz | 2580043 + 6720 \* N, N=0:29,2585083, 2655643, 2692603, 2764843 |

### 5.4.3 Synchronization raster

#### 5.4.3.1 Synchronization raster and numbering

The synchronization raster indicates the frequency positions of the synchronization block that can be used by the UE for system acquisition when explicit signalling of the synchronization block position is not present.

A global synchronization raster is defined for all frequencies. The frequency position of the SS block is defined as SSREF with corresponding number GSCN. The parameters defining the SSREF and GSCN for all the frequency ranges are in table 5.4.3.1-1.

The resource element corresponding to the SS block reference frequency SSREF is given in clause 5.4.3.2. The synchronization raster and the subcarrier spacing of the synchronization block is defined separately for each band.

Table 5.4.3.1-1: GSCN parameters for the global frequency raster

|  |  |  |  |
| --- | --- | --- | --- |
| Range of frequencies (MHz) | SS block frequency position SSREF | GSCN | Range of GSCN |
| 0 – 3000 | N \* 1200 kHz + M \* 50 kHz,N = 1:2499, M ϵ {1,3,5} (Note) | 3N + (M-3)/2 | 2 – 7498 |
| 3000 – 24250 | 3000 MHz + N \* 1.44 MHz, N = 0:14756 | 7499 + N | 7499 – 22255 |
| 24250 – 100000 | 24250.08 MHz + N \* 17.28 MHz, N = 0:4383 | 22256 + N | 22256 – 26639 |
| NOTE: The default value for *operating bands* which only support SCS spaced channel raster(s) is M=3. |

5.4.3.2 Synchronization raster to synchronization block resource element mapping

The mapping between the synchronization raster and the corresponding resource element of the SS block is given in table 5.4.3.2-1.

**Table 5.4.3.2-1: Synchronization Raster to SS block Resource Element Mapping**

|  |  |
| --- | --- |
| Resource element index k | 120 |
|  |  |

*k* is the subcarrier number of SS/PBCH block defined in TS 38.211 clause 7.4.3.1 [9].

#### 5.4.3.3 Synchronization raster entries for each operating band

The synchronization raster for each band is give in table 5.4.3.3-1. The distance between applicable GSCN entries is given by the <Step size> indicated in table 5.4.3.3-1 for FR1 and table 5.4.3.3-2 for FR2.

Table 5.4.3.3-1: Applicable SS raster entries per *operating band* (FR1)

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern(NOTE 1) | Range of GSCN(First – <Step size> – Last) |
| n1 | 15 kHz | Case A | 5279 – <1> – 5419 |
| n2 | 15 kHz | Case A | 4829 – <1> – 4969 |
| n3 | 15 kHz | Case A | 4517 – <1> – 4693 |
| n5 | 15 kHz | Case A | 2177 – <1> – 2230 |
|  | 30 kHz | Case B | 2183 – <1> – 2224 |
| n7 | 15 kHz | Case A | 6554 – <1> – 6718 |
| n8 | 15 kHz | Case A | 2318 – <1> – 2395 |
| n12 | 15 kHz | Case A | 1828 – <1> – 1858 |
| n13 | 15 kHz | Case A | 1871 – <1> – 1885 |
| n14 | 15 kHz | Case A | 1901 – <1> – 1915 |
| n18 | 15kHz | CaseA | 2156 – <1> – 2182 |
| n20 | 15 kHz | Case A | 1982 – <1> – 2047 |
| n24 | 15 kHz | Case A | 3818 – <1> – 3892 |
| 30 kHz | Case B | 3824 – <1> – 3886 |
| n25 | 15 kHz | Case A | 4829 – <1> – 4981 |
| n26 | 15 kHz | Case A | 2153 – <1> – 2230 |
| n28 | 15 kHz | Case A | 1901 – <1> – 2002 |
| n29 | 15 kHz | Case A | 1798 – <1> – 1813 |
| n30 | 15 kHz | Case A | 5879 – <1> – 5893 |
| n34 | 15 kHz | Case A | NOTE 3 |
|  | 30 kHz | Case C | 5036 – <1> – 5050 |
| n38 | 15 kHz | Case A | NOTE 2 |
|  | 30 kHz | Case C | 6437 – <1> – 6538 |
| n39 | 15 kHz | Case A | NOTE 4 |
|  | 30 kHz | Case C | 4712 – <1> – 4789 |
| n40 | 30 kHz | Case C | 5762 – <1> – 5989 |
| n41 | 15 kHz | Case A | 6246 – <3> – 6717 |
|  | 30 kHz | Case C | 6252 – <3> – 6714 |
| n465 | 30 kHz | Case C | 8993 – <1> – 9530 |
| n48 | 30 kHz | Case C | 7884 – <1> – 7982 |
| n50 | 30 kHz | Case C | 3590 – <1> – 3781 |
| n51 | 15 kHz | Case A | 3572 – <1> – 3574 |
| n53 | 15 kHz | Case A | 6215 – <1> – 6232 |
| n65 | 15 kHz | Case A | 5279 – <1> – 5494 |
| n66 | 15 kHz | Case A | 5279 – <1> – 5494 |
|  | 30 kHz | Case B | 5285 – <1> – 5488 |
| n67 | 15 kHz | Case A | 1850 – <1> – 1888 |
| n70 | 15 kHz | Case A | 4993 – <1> – 5044 |
| n71 | 15 kHz | Case A | 1547 – <1> – 1624 |
| n74 | 15 kHz | Case A | 3692 – <1> – 3790 |
| n75 | 15 kHz | Case A | 3584 – <1> – 3787 |
| n76 | 15 kHz | Case A | 3572 – <1> – 3574 |
| n77 | 30 kHz | Case C | 7711 – <1> – 8329 |
| n78 | 30 kHz | Case C | 7711 – <1> – 8051 |
| n79 | 30 kHz | Case C | 8480 – <16> – 88807 |
|  |  |  | 8475 – <1> – 88848 |
| n85 | 15 kHz | Case A | 1826 – <1> – 1858 |
| n90 | 15 kHz | Case A | 6246 – <1> – 671710 |
|  | 15 kHz | Case A | 6245 – <1> – 671811 |
|  | 30 kHz | Case C | 6252 – <1> – 6714 |
| n91 | 15 kHz | Case A | 3572 – <1> – 3574 |
| n92 | 15 kHz | Case A | 3584 – <1> – 3787 |
| n93 | 15 kHz | Case A | 3572 – <1> – 3574 |
| n94 | 15 kHz | Case A | 3584 – <1> – 3787 |
| n96**6** | 30 kHz | Case C | 9531 – <1> – 10363 |
| n100 | 15 kHz | Case A | 2303 – <1> – 2307 |
| n101 | 15 kHz | Case A | 4754 – <1> – 4768 |
| 30kHz | Case C | 4760 – <1> – 4764 |
| n102**9** | 30 kHz | Case C | 9531 – <1> – 9877 |
| n104 | 30 kHz | Case C | 9882 – <7> – 10358 |
| NOTE 1: SS Block pattern is defined in clause 4.1 in TS 38.213 [10].NOTE 2: The applicable SS raster entries are GSCN = {6432, 6443, 6457, 6468, 6479, 6493, 6507, 6518, 6532, 6543}NOTE 3: The applicable SS raster entries are GSCN = {5032, 5043, 5054}NOTE 4: The applicable SS raster entries are GSCN = {4707, 4715, 4718, 4729, 4732, 4743, 4747, 4754, 4761, 4768, 4772, 4782, 4786, 4793}NOTE 5: The following GSCN are allowed for operation in band n46: GSCN = {8996, 9010, 9024, 9038, 9051, 9065, 9079, 9093, 9107, 9121, 9218, 9232, 9246, 9260, 9274, 9288, 9301, 9315, 9329, 9343, 9357, 9371, 9385, 9402, 9416, 9430, 9444, 9458, 9472, 9485, 9499, 9513}.NOTE 6: The following GSCN are allowed for operation in band n96: GSCN = { 9548, 9562, 9576, 9590, 9603, 9617, 9631, 9645, 9659, 9673, 9687, 9701, 9714, 9728, 9742, 9756, 9770, 9784, 9798, 9812, 9826, 9840, 9853, 9867, 9881, 9895, 9909, 9923, 9937, 9951, 9964, 9978, 9992, 10006, 10020, 10034, 10048, 10062, 10076, 10090, 10103, 10117, 10131, 10145, 10159, 10173, 10187, 10201, 10214, 10228, 10242, 10256, 10270, 10284, 10298, 10312, 10325, 10339, 10353}.NOTE 7: The SS raster entries apply for channel bandwidths larger than or equal to 40 MHz.NOTE 8: The SS raster entries apply for channel bandwidths smaller than 40 MHz.NOTE 9: The following GSCN are allowed for operation in band n102: GSCN = {9535, 9548, 9562, 9576, 9590, 9603, 9617, 9631, 9645, 9659, 9673, 9687, 9701, 9714, 9728, 9742, 9756, 9770, 9784, 9798, 9812, 9826, 9840, 9853, 9867}NOTE 10: The SS raster entries apply for channel bandwidths larger than or equal to 10 MHz.NOTE 11: The SS raster entries apply for channel bandwidth equal to 5 MHz. |

Table 5.4.3.3-2: Applicable SS raster entries per *operating band* (FR2)

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern(note 1) | Range of GSCN(First – <Step size> – Last) |
| n257 | 120 kHz | Case D | 22388 – <1> – 22558 |
|  | 240 kHz | Case E | 22390 – <2> – 22556 |
| n258 | 120 kHz | Case D | 22257 – <1> – 22443 |
|  | 240 kHz | Case E | 22258 – <2> – 22442 |
| n259 | 120 kHz | Case D | 23140 – <1> – 23369 |
|  | 240 kHz | Case E | 23142 – <2> – 23368 |
| n260 | 120 kHz | Case D | 22995 – <1> – 23166 |
|  | 240 kHz | Case E | 22996 – <2> – 23164 |
| n261 | 120 kHz | Case D | 22446 – <1> – 22492 |
|  | 240 kHz | Case E | 22446 – <2> – 22490 |
| n262 | 120 kHz | Case D | 23586 – <1> – 23641 |
|  | 240 kHz | Case E | 23588 – <2> – 23640 |
| n263 | 120 kHz | Case D | Table 5.4.3.3-2 |
|  | 480 kHz | Case F |  |
|  | 960 kHz2 | Case G | 24162 – <6> – 24954 |
| NOTE 1: SS Block pattern is defined in section 4.1 in TS 38.213 [10].NOTE 2: SS Block SCS of 960 kHz is not used for initial access. |

Table 5.4.3.3-3: Allowed GSCN for operation in band n263 for 120 kHz and 480 kHz

|  |  |
| --- | --- |
| SS Block SCS | Range of GSCN |
| 120 kHz | 24156 + 6 \* N – 3 \* floor((N+5)/18), N=0:137 |
| 480 kHz | 24162 + 24 \* N – 12 \* floor((N+4)/18), N=0:33 |