**3GPP TSG- RAN WG4 Meeting # 111R4-2410598**

**Fukuoka, Japan, 20th–24th May, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.104** | **CR** | **0623** | **rev** | **1** | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *For* ***[HELP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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:*** | CR for TS 38.104: Define the reserved GSCN / ARFCN-ValueNR and NR operating band | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE Corporation, Sanechips, Nokia, Qualcomm, Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_FR1\_lessthan\_5MHz\_BW-Core | | | | |  | ***Date:*** | | | 2024-05-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To solve backward compatibility issue for legacy UEs not supporting less than 5MHz but provided with a neighbour cell with SSB on the new GSCN value, RAN2 introduces new signallings of dl-CarrierFreq-r18 and frequencyBandList-r18 in SIB4 for the cells with <5MHz BW. However, legacy signallings are mandatory, RAN2 proposes to set legacy fields as reserved values, which will be ignored by the new UE, when the new fields are indicated. From RAN4 perspective, we can define NR band n200 and GSCN=2 (corresponding to ARFCN-ValueNR = 250) as reserved values. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce band n200 and GSCN=2 (corresponding to ARFCN-ValueNR = 250) as reserved values. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Backward compatibility issue for legacy UEs not supporting less than 5MHz but provided with a neighbour cell with SSB on the new GSCN value can not be solved completely. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2, 5.4.3.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

## << Start of changes >>

## 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.

NR operating bands n1, n3, n34, n39, n41, n78, n79, which are defined in Table 5.2-1, can be applied for ATG 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, n31, n41, n65, n66, n70, n71, n72, n74, n85, n90, n106 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 transmit  FUL,low – FUL,high  (MHz) | Downlink (DL) *operating band* BS transmit / UE receive  FDL,low – FDL,high  (MHz) | Duplex mode | Notes |
| n1 | 1920 – 1980 | 2110 – 2170 | FDD |  |
| n2 | 1850 – 1910 | 1930 – 1990 | FDD |  |
| n3 | 1710 – 1785 | 1805 – 1880 | FDD |  |
| n5 | 824 – 849 | 869 – 894 | FDD |  |
| n7 | 2500 – 2570 | 2620 – 2690 | FDD |  |
| n8 | 880 – 915 | 925 – 960 | FDD |  |
| n12 | 699 – 716 | 729 – 746 | FDD |  |
| n13 | 777 – 787 | 746 – 756 | FDD |  |
| n14 | 788 – 798 | 758 – 768 | FDD |  |
| n18 | 815 – 830 | 860 – 875 | FDD |  |
| n20 | 832 – 862 | 791 – 821 | FDD |  |
| n24 | 1626.5 – 1660.5 | 1525 – 1559 | FDD | Note 7 |
| n25 | 1850 – 1915 | 1930 – 1995 | FDD |  |
| n26 | 814 – 849 | 859 – 894 | FDD |  |
| n28 | 703 – 748 | 758 – 803 | FDD |  |
| n29 | N/A | 717 – 728 | SDL |  |
| n30 | 2305 – 2315 | 2350 – 2360 | FDD |  |
| n31 | 452.5 – 457.5 | 462.5 – 467.5 | FDD |  |
| n34 | 2010 – 2025 | 2010 – 2025 | TDD |  |
| n38 | 2570 – 2620 | 2570 – 2620 | TDD |  |
| n39 | 1880 – 1920 | 1880 – 1920 | TDD |  |
| n40 | 2300 – 2400 | 2300 – 2400 | TDD |  |
| n41 | 2496 – 2690 | 2496 – 2690 | TDD |  |
| n46 | 5150 – 5925 | 5150 – 5925 | TDD | Note 3 |
| n48 | 3550 – 3700 | 3550 – 3700 | TDD |  |
| n50 | 1432 – 1517 | 1432 – 1517 | TDD |  |
| n51 | 1427 – 1432 | 1427 – 1432 | TDD |  |
| n53 | 2483.5 – 2495 | 2483.5 – 2495 | TDD |  |
| n54 | 1670 – 1675 | 1670 – 1675 | TDD |  |
| n65 | 1920 – 2010 | 2110 – 2200 | FDD |  |
| n66 | 1710 – 1780 | 2110 – 2200 | FDD |  |
| n67 | N/A | 738 – 758 | SDL |  |
| n70 | 1695 – 1710 | 1995 – 2020 | FDD |  |
| n71 | 663 – 698 | 617 – 652 | FDD |  |
| n72 | 451 – 456 | 461 – 466 | FDD |  |
| n74 | 1427 – 1470 | 1475 – 1518 | FDD |  |
| n75 | N/A | 1432 – 1517 | SDL |  |
| n76 | N/A | 1427 – 1432 | SDL |  |
| n77 | 3300 – 4200 | 3300 – 4200 | TDD |  |
| n78 | 3300 – 3800 | 3300 – 3800 | TDD |  |
| n79 | 4400 – 5000 | 4400 – 5000 | TDD |  |
| n80 | 1710 – 1785 | N/A | SUL |  |
| n81 | 880 – 915 | N/A | SUL |  |
| n82 | 832 – 862 | N/A | SUL |  |
| n83 | 703 – 748 | N/A | SUL |  |
| n84 | 1920 – 1980 | N/A | SUL |  |
| n85 | 698 – 716 | 728 – 746 | FDD |  |
| n86 | 1710 – 1780 | N/A | SUL |  |
| n89 | 824 – 849 | N/A | SUL |  |
| n90 | 2496 – 2690 | 2496 – 2690 | TDD |  |
| n91 | 832 – 862 | 1427 – 1432 | FDD | Note 2 |
| n92 | 832 – 862 | 1432 – 1517 | FDD | Note 2 |
| n93 | 880 – 915 | 1427 – 1432 | FDD | Note 2 |
| n94 | 880 – 915 | 1432 – 1517 | FDD | Note 2 |
| n95 | 2010 – 2025 | N/A | SUL | Note 1 |
| n96 | 5925 – 7125 | 5925 – 7125 | TDD | Note 3, Note 4 |
| n97 | 2300 – 2400 | N/A | SUL | Note 5 |
| n98 | 1880 – 1920 | N/A | SUL | Note 5 |
| n99 | 1626.5 – 1660.5 | N/A | SUL | Note 6 |
| n100 | 874.4 – 880 | 919.4 – 925 | FDD |  |
| n101 | 1900 – 1910 | 1900 – 1910 | TDD |  |
| n102 | 5925 – 6425 | 5925 – 6425 | TDD | Note 3, Note 4 |
| n104 | 6425 – 7125 | 6425 – 7125 | TDD | Note 8 |
| n105 | 663 – 703 | 612 – 652 | FDD |  |
| n106 | 896 – 901 | 935 – 940 | FDD |  |
| n109 | 703 – 733 | 1432 – 1517 | FDD | Note 2 |
| 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 subject to country-specific conditions.  NOTE 9: Operating band n200 is a reserved value. | | | | |

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

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

## << Next change >>

#### 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 for above 3 MHz channel bandwidth and in table 5.4.3.1-2 for 3 MHz channel bandwidth.

For band n100, additional parameters defining the SSREF and GSCN are specified in table 5.4.3.1-3.

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.

The synchronization raster and the corresponding SS block do not cover all possible RF channel bandwidths and locations on Enhanced channel raster.

Table 5.4.3.1-1: GSCN parameters for the global frequency raster for above 3 MHz channel bandwidth

|  |  |  |  |
| --- | --- | --- | --- |
| 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} 1 | 3N + (M-3)/2 | 22 – 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 1: The default value for *operating bands* which only support SCS spaced channel raster(s) is M=3.  NOTE 2: GSCN=2 (corresponding to ARFCN-ValueNR = 250) is a reserved value paired with reserved operating band n200. | | | |

**Table 5.4.3.1-2: GSCN parameters for the global frequency raster for 3 MHz channel bandwidth**

|  |  |  |  |
| --- | --- | --- | --- |
| **Range of frequencies (MHz)** | **SS block frequency position SSREF** | **GSCN** | **Range of GSCN** |
| 0 – 1000 | N \* 600 kHz + M \* 50 kHz + 300 kHz,  N = 1:1665, M ϵ {1,3,5} (Note 1) | 26638 + 3N + (M-3)/2 | 26640 – 31634 |
| NOTE 1: Only applicable for 15 PRB transmission bandwidth configuration within 3 MHz channel bandwidth with punctured PBCH defined in TS 38.211 [9] clause 7.4.3.1. | | | |

**Table 5.4.3.1-3: Additional GSCN parameters for the global frequency raster and for band n100**

|  |  |  |
| --- | --- | --- |
| **SS block frequency position SSREF**  **(MHz)** | **GSCN** | **Note** |
| 920.73 | 41637 | Only applicable for 12 PRB transmission bandwidth configuration within 3 MHz channel with punctured PBCH defined in TS 38.211 [9] clause 7.4.3.1. |
| 921.45 | 41638 | Only applicable for 20 PRB transmission bandwidth configuration within 5 MHz channel with unpunctured PBCH defined in TS 38.211 [9] clause 7.4.3.1. |

## << End of changes >>