3GPP TSG-RAN WG4 Meeting #111 R4-2409946

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.104** | **CR** | **0636** | **rev** | **1** | **Current version:** | **17.13.0** |  |
|  | | | | | | | | |
| *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:*** | CR to TS 38.104: Clarifications on RMR terminology and related operating bands | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RAIL\_EU\_900MHz-Core, NR\_RAIL\_EU\_1900MHz\_TDD-Core | | | | |  | ***Date:*** | | | 2024-05-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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:*** | | Referring to clause 5.2, multiple NR operating bands are applicable on regional basis with appropriate clarification notes added in Table 5.2-1. In case of RMR bands n100/n101, which are applicable to CEPT countries subject to ECC Decision (20)02, there is no such clarification note, which leads to ambiguity.  Additionally, RMR definition is added, clarifying relation among RMR and FRMCS in the context of NR specification.  In this CR we provide clarifications on RMR and related operating bands. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | NR operating bands table updated with a new Note on RMR bands and their applicability.  Missing definition and abbreviations added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Ambiguity on the RMR terminology and relation among NR specifications and GSM-R would remain.  Ambiguity on the n100/n101 applicability in clause 5.2 would remain. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 3.3, 5.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.101-1 CR#2352 | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.141-1 CR#0450 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*------------------------------ Modified section ------------------------------*

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

*------------------------------ Unchanged part omitted ------------------------------*

**Radio Bandwidth:** frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier

**Railway Mobile Radio:** railway operations encompassing GSM-R and its successor(s), including the Future Railway Mobile Communication System (FRMCS); in the context of this specification the Railway Mobile Radio is limited to NR operation in band n100, or n101

**rated beam EIRP:** For a declared beam and *beam direction pair*, the *rated beam EIRP* level is the maximum power that the base station is declared to radiate at the associated *beam peak direction* during the *transmitter ON period*

*------------------------------ Next modified section ------------------------------*

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AA Antenna Array

AAS Active Antenna System

ACLR Adjacent Channel Leakage Ratio

ACS Adjacent Channel Selectivity

AoA Angle of Arrival

AWGN Additive White Gaussian Noise

BS Base Station

BW Bandwidth

CA Carrier Aggregation

CACLR Cumulative ACLR

CPE Common Phase Error

CP-OFDM Cyclic Prefix-OFDM

CW Continuous Wave

DFT-s-OFDM Discrete Fourier Transform-spread-OFDM

DM-RS Demodulation Reference Signal

EIS Equivalent Isotropic Sensitivity

EIRP Effective Isotropic Radiated Power

E-UTRA Evolved UTRA

EVM Error Vector Magnitude

FBW Fractional Bandwidth

FR Frequency Range

FRC Fixed Reference Channel

FRMCS Future Railway Mobile Communication System

GSCN Global Synchronization Channel Number

GSM Global System for Mobile communications

HAPS High Altitude Platform Station

*------------------------------ Next modified section ------------------------------*

## 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 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 |  |
| 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 |  |
| 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 |  |
| 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 | Note 9 |
| n101 | 1900 – 1910 | 1900 – 1910 | TDD | Note 9 |
| n102 | 5925 – 6425 | 5925 – 6425 | TDD | Note 3, Note 4 |
| n104 | 6425 – 7125 | 6425 – 7125 | TDD | Note 8 |
| 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: This band is applicable to CEPT countries subject to ECC Decision (20)02 [21], for the RMR application. | | | | |

*------------------------------ End of modified section -------------------------*