**3GPP TSG-RAN WG4 Meeting #100-e *R4-2115831***

**Electronic meeting, August 16-27, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.104** | **CR** | **<CR#>** | **rev** |  | **Current version:** | **16.10.0** |  |
|  | | | | | | | | |
| *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 for TS 37.104 Maintenance (Rel-16, CAT F) | | | | | | | | | |
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| ***Source to WG:*** | MCC, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16,  MSR\_GSM\_UTRA\_LTE\_NR-Core NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2021-08-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CRs merge the multiple endorsed draf CRs. The reason for change in each endorsed draft CR is copied below.  **R4-2114400 Draft CR to TS 37.104: addition of the missing note in applicability table for BC2 WA BS OBUE, Rel-16**  Compared to the Rel-15 version of the TS 37.104, there is a missing note 2 in Table 6.6.2.2-0 (*Applicability of operating band unwanted emission requirements for BC2 Wide Area BS*).   |  | | --- | |  |   Please also refer to the TS 37.141 Rel-16, where that missing note is present.  **R4-2115650 Draft CR to 37.104: MSR band table update**  AT RAN4#99e, the band tables in the MSR specifications were corrected to properly describe the support of NR in different bands. It was also proposed to create a new more streamlined band table with fewer notes in Rel-17, but that discussion was postponed.  The present band table has one column with MSR/E-UTRA band number and separate columns for NR, UTRA and GSM/EDGE band numbers. Since there are no columns for E-UTRA and NB-IoT, it is not possible to express the support of those RATs through table entries and it is instead done with notes, but not consistently. Notes are also used for the other RATs however, which duplicates information in the table. The number of notes has also grown with new RAT combinations added and there are presently 13 notes. This may get even more complicated with new bands added and the band table should be updated to become less ambiguous and more future proof. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each each endorsed draft CR is copied below.  **R4-2114400 Draft CR to TS 37.104: addition of the missing note in applicability table for BC2 WA BS OBUE, Rel-16**  Addition of the missing note 2 in table 6.6.2.2-0.  **R4-2115650 Draft CR to 37.104: MSR band table update**  Revised band tables are introduced where the RAT support is described in separate columns for each RAT, which also reduces the number of table notes from 13 to 6.  UTRA support for Bands 15 and 16 has been removed, since the corresponding ETSI standard (TS 102 735) was made *historical* in 2017. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.  **R4-2114400 Draft CR to TS 37.104: addition of the missing note in applicability table for BC2 WA BS OBUE, Rel-16**  Rel-15 and Rel-16 versions of the specification would be misaligned.  Core specification would be missaligned with the test specification in TS 37.141.  **R4-2115650 Draft CR to 37.104: MSR band table update**  The RAT support in different bands for MSR BS would remain ambiguous and difficult to update. | | | | | | | | |
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| ***Clauses affected:*** | | **R4-2114400 Draft CR to TS 37.104: addition of the missing note in applicability table for BC2 WA BS OBUE, Rel-16**  6.6.2.2  **R4-2115650 Draft CR to 37.104: MSR band table update**  4.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

***<Start of change1>***

## 4.5 Operating bands and Band Categories

MSR requirements are applicable for band definitions and band numbering as defined in the specifications TS 45.005 [5], TS25.104 [2], TS 25.105 [3], TS 36.104 [4] and TS 38.104 [17]. For the purpose of defining the BS requirements, the operating bands are divided into three band categories as follows:

- Band Category 1 (BC1): Bands for NR FDD, E-UTRA FDD and/or UTRA FDD operation. Bands in this category are also used for NB-IoT operation (all modes)

- Band Category 2 (BC2): Bands for NR FDD, E-UTRA FDD, UTRA FDD and/or GSM/EDGE operation. Bands in this category are also used for NB-IoT operation (all modes)

- Band Category 3 (BC3): Bands for NR TDD, E-UTRA TDD and/or UTRA TDD operation. Bands in this category are also used for NB-IoT operation (all modes)

NOTE: For UTRA TDD, requirements in the present document cover the 1.28 Mcps UTRA TDD option.

The paired and unpaired bands for the three Band Categories are shown in Table 4.5-1 and 4.5-2, together with the supported RATs and corresponding NR, E-UTRA, UTRA and GSM/EDGE band designations.

Table 4.5-1: Paired bands in NR, E-UTRA, UTRA and GSM/EDGE.

| MSR Band number | Supported RATs and Band Numbers | | | | | Uplink (UL)  BS receive,  UE transmit  (MHz) | Downlink (DL)  BS transmit,  UE receive  (MHz) | BC | Notes |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR | E-UTRA | NB-IoT | UTRA | GSM/EDGE |  |
| 1 | n1 | 1 | X | I | - | 1920 – 1980 | 2110 – 2170 | 1 |  |
| 2 | n2 | 2 | X | II | PCS  1900 | 1850 – 1910 | 1930 – 1990 | 2 |  |
| 3 | n3 | 3 | X | III | DCS  1800 | 1710 – 1785 | 1805 – 1880 | 2 |  |
| 4 | - | 4 | X | IV | - | 1710 – 1755 | 2110 – 2155 | 1 |  |
| 5 | n5 | 5 | X | V | GSM  850 | 824 – 849 | 869 – 894 | 2 |  |
| 6 | - | - | - | VI | - | 830 – 840 | 875 – 885 | 1 |  |
| 7 | n7 | 7 | X | VII | - | 2500 – 2570 | 2620 – 2690 | 1 |  |
| 8 | n8 | 8 | X | VIII | E-GSM | 880 – 915 | 925 – 960 | 2 |  |
| 9 | - | 9 | - | IX | - | 1749.9 – 1784.9 | 1844.9 – 1879.9 | 1 |  |
| 10 | - | 10 | - | X | - | 1710 – 1770 | 2110 – 2170 | 1 |  |
| 11 | - | 11 | X | XI | - | 1427.9 – 1447.9 | 1475.9 – 1495.9 | 1 |  |
| 12 | n12 | 12 | X | XII | - | 699 – 716 | 729 – 746 | 1 |  |
| 13 | - | 13 | X | XIII | - | 777 – 787 | 746 – 756 | 1 |  |
| 14 | n14 | 14 | X | XIV | - | 788 – 798 | 758 – 768 | 1 |  |
| 15 | - | - | - | - | - | Reserved | |  |  |
| 16 | - | - | - | - | - | Reserved | |  |  |
| 17 | - | 17 | X | - | - | 704 – 716 | 734 – 746 | 1 |  |
| 18 | n18 | 18 | X | - | - | 815 – 830 | 860 – 875 | 1 |  |
| 19 | - | 19 | X | XIX | - | 830 – 845 | 875 – 890 | 1 |  |
| 20 | n20 | 20 | X | XX | - | 832 – 862 | 791 – 821 | 1 |  |
| 21 | - | 21 | X | XXI | - | 1447.9 – 1462.9 | 1495.9 – 1510.9 | 1 |  |
| 22 | - | 22 | - | XXII | - | 3410 – 3490 | 3510 – 3590 | 1 |  |
| 23 | - | 23 | - | - | - | 2000 – 2020 | 2180 – 2200 | 1 | Note 4 |
| 24 | - | 24 | - | - | - | 1626.5 – 1660.5 | 1525 – 1559 | 1 | Note 6 |
| 25 | n25 | 25 | X | XXV | - | 1850 – 1915 | 1930 – 1995 | 1 |  |
| 26 | n26 | 26 | X | XXVI | - | 814 – 849 | 859 – 894 | 1 |  |
| 27 | - | 27 | - | - | - | 807 – 824 | 852 – 869 | 1 |  |
| 28 | n28 | 28 | X | - | - | 703 – 748 | 758 – 803 | 1 |  |
| 29 | n29 | 29 | - | - | - | N/A | 717 – 728 | 1 | Note 1 |
| 30 | n30 | 30 | - | - | - | 2305 – 2315 | 2350 – 2360 | 1 |  |
| 31 | - | 31 | X | - | - | 452.5 – 457.5 | 462.5 – 467.5 | 1 |  |
| 32 | - | 32 | - | XXXII | - | N/A | 1452 – 1496 | 1 | Note1, Note 2 |
| 64 | - | - | - | - | - | Reserved | |  |  |
| 65 | n65 | 65 | X | - | - | 1920 – 2010 | 2110 – 2200 | 1 |  |
| 66 | n66 | 66 | X | - | - | 1710 – 1780 | 2110 – 2200 | 1 | Note 7 |
| 67 | - | 67 | - | - | - | N/A | 738 – 758 | 1 | Note 1 |
| 68 | - | 68 | - | - | - | 698 – 728 | 753 – 783 | 1 |  |
| 69 | - | 69 | - | - | - | N/A | 2570 – 2620 | 1 | Note 1 |
| 70 | n70 | 70 | X | - | - | 1695 – 1710 | 1995 – 2020 | 1 | Note 5 |
| 71 | n71 | 71 | X | - | - | 663 – 698 | 617 – 652 | 1 |  |
| 72 | - | 72 | X | - | - | 451 – 456 | 461 – 466 | 1 |  |
| 73 | - | 73 | X | - | - | 450 – 455 | 460 – 465 | 1 |  |
| 74 | n74 | 74 | X | - | - | 1427 – 1470 | 1475 – 1518 | 1 |  |
| 75 | n75 | 75 | - | - | - | N/A | 1432 – 1517 | 1 | Note 1 |
| 76 | n76 | 76 | - | - | - | N/A | 1427 – 1432 | 1 | Note 1 |
| 85 | - | 85 | X | - | - | 698 – 716 | 728 – 746 | 1 |  |
| 87 | - | 87 | X | - | - | 410 – 415 | 420 – 425 | 1 |  |
| 88 | - | 88 | X | - | - | 412 – 417 | 422 – 427 | 1 |  |
| NOTE 1: For NR and/or E-UTRA, the band is restricted to operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.  NOTE 2: For UTRA, the band is restricted to operation when dual band is configured (e.g., DB-DC-HSDPA or dual band 4C-HSDPA). The down link frequenc(ies) of this band are paired with the uplink frequenc(ies) of the other FDD band (external) of the dual band configuration.  NOTE 3: For E-UTRA, the range 2180-2200 MHz of the DL operating band is restricted to operation when carrier aggregation is configured.  NOTE 4: Band 23 is not applicable.  NOTE 5: For E-UTRA, the range 2010-2020 MHz of the DL operating band is restricted to operation when carrier aggregation is configured, and TX-RX separation is 300 MHz. For E-UTRA, the range 2005-2020 MHz of the DL operating band is restricted to operation when carrier aggregation is configured, and TX-RX separation is 295 MHz.  NOTE 6: 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 DA 20-48. | | | | | | | | | |



UTRA FDD can operate with DB-DC-HSDPA for the band configurations listed in subclause 5.2 c) of TS 25.104 [2].

NOTE: For BS capable of multi-band operation, the supported operating bands may belong to different Band Categories.

Table 4.5-2: Unpaired bands in NR, E-UTRA and UTRA.

| MSR Band number | Supported RATs and Band Numbers | | | | Uplink (UL)  BS receive,  UE transmit  (MHz) | Downlink (DL)  BS transmit,  UE receive  (MHz) | BC | Notes |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR | E-UTRA | NB-IoT | UTRA |  |
| 33 | - | 33 | - | a) | 1900 – 1920 | 1900 – 1920 | 3 |  |
| 34 | n34 | 34 | - | a) | 2010 – 2025 | 2010 – 2025 | 3 |  |
| 35 | - | 35 | - | b) | 1850 – 1910 | 1850 – 1910 | 3 |  |
| 36 | - | 36 | - | b) | 1930 – 1990 | 1930 – 1990 | 3 |  |
| 37 | - | 37 | - | c) | 1910 – 1930 | 1910 – 1930 | 3 |  |
| 38 | n38 | 38 | - | d) | 2570 – 2620 | 2570 – 2620 | 3 |  |
| 39 | n39 | 39 | - | f) | 1880 – 1920 | 1880 – 1920 | 3 |  |
| 40 | n40 | 40 | - | e) | 2300 – 2400 | 2300 – 2400 | 3 |  |
| 41 | n41 | 41 | X | - | 2496 – 2690 | 2496 – 2690 | 3 | Note 1 |
| 42 | - | 42 | X | - | 3400 – 3600 | 3400 – 3600 | 3 |  |
| 43 | - | 43 | X | - | 3600 – 3800 | 3600 – 3800 | 3 |  |
| 44 | - | 44 | - | - | 703 – 803 | 703 – 803 | 3 |  |
| 45 | - | 45 | - | - | 1447 – 1467 | 1447 – 1467 | 3 |  |
| 48 | n48 | 48 | - | - | 3550 – 3700 | 3550 – 3700 | 3 |  |
| 50 | n50 | 50 | - | - | 1432 – 1517 | 1432 – 1517 | 3 |  |
| 51 | n51 | 51 | - | - | 1427 – 1432 | 1427 – 1432 | 3 |  |
| 52 | - | 52 | - | - | 3300 – 3400 | 3300 – 3400 | 3 |  |
| 53 | n53 | 53 | - | - | 2483.5 – 2495 | 2483.5 – 2495 | 3 |  |
| 77 | n77 | - | - | - | 3300 – 4200 | 3300 – 4200 | 3 |  |
| 78 | n78 | - | - | - | 3300 – 3800 | 3300 – 3800 | 3 |  |
| NOTE 1: Band 41 supports NB-IoT in certain regions. | | | | | | | | |



E-UTRA is designed to operate for the carrier aggregation bands defined in TS 36.101 [18]. The E-UTRA channel bandwidth BWChannel for a single carrier and the Aggregated Channel Bandwidth BWChannel\_CA for E-UTRA carrier aggregation are specified in Clause 5.6 of TS 36.104 [4].

The NB-IoT channel bandwidth BWChannel is specified in Clause 5.6 of TS 36.104 [4].

The NR BS channel bandwidth and PRB utilization is specified in Clause 5.3 of TS 38.104 [17].

***<End of change1>***

***<Start of change2>***

#### 6.6.2.2 General minimum requirement for Band Category 2

For a BS operating in Band Category 2 the requirement applies outside the Base Station RF Bandwidth edges. In addition, for a BS operating in non-contiguous spectrum, it applies inside any sub-block gap.

Outside the Base Station RF Bandwidth edges, emissions shall not exceed the maximum levels specified in Tables 6.6.2.2-1 to 6.6.2.2-8 below, where:

- Δf is the separation between the Base Station RF Bandwidth edge frequency and the nominal -3dB point of the measuring filter closest to the carrier frequency.

- f\_offset is the separation between the Base Station RF Bandwidth edge frequency and the centre of the measuring filter.

- f\_offsetmax is the offset to the frequency ΔfOBUE outside the downlink operating band.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For a BS operating in multiple bands, inside any Inter-RF Bandwidth gaps with Wgap < 2\*ΔfOBUE, emissions shall not exceed the cumulative sum of the minimum requirements specified at the Base Station RF Bandwidth edges on each side of the Inter-RF Bandwidth gap. The minimum requirement for Base Station RF Bandwidth edge is specified in Table 6.6.2.2-1 to 6.6.2.2-8 below, where in this case:

- Δf is the separation between the Base Station RF Bandwidth edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency.

- f\_offset is the separation between the Base Station RF Bandwidth edge frequency and the centre of the measuring filter.

- f\_offsetmax is equal to the Inter RF Bandwidth gap minus half of the bandwidth of the measuring filter.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For a BS capable of multi-band operation where multiple bands are mapped on the same antenna connector and where there is no carrier transmitted in an operating band, the operating band unwanted emission limit, as defined in the tables of the present subclause for the largest frequency offset (Δfmax), of a band where there is no carrier transmitted shall apply from ΔfOBUE below the lowest frequency, up to ΔfOBUE above the highest frequency of the supported downlink operating band without any carrier transmitted. And no cumulative limits are applied in the inter-band gap between a supported downlink band with carrier(s) transmitted and a supported downlink band without any carrier transmitted.

Inside any sub-block gap for a BS operating in non-contiguous spectrum, emissions shall not exceed the cumulative sum of the minimum requirement specified for the adjacent sub blocks on each side of the sub block gap. The minimum requirement for each sub block is specified in Tables 6.6.2.2-1 to 6.6.2.2-8 below, where in this case:

- Δf is the separation between the sub block edge frequency and the nominal -3 dB point of the measuring filter closest to the sub block edge.

- f\_offset is the separation between the sub block edge frequency and the centre of the measuring filter.

- f\_offsetmax is equal to the sub block gap bandwidth minus half of the bandwidth of the measuring filter.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

Applicability of Wide Area operating band unwanted emission requirements in Tables 6.6.2.2-1, 6.6.2.2-2a and 6.6.2.2-2b is specified in Table 6.6.2.2-0.

Note: Option 1 and option 2 correspond to the Category B option 1/2 operating band unwanted emissions defined in the E-UTRA and NR specifications TS 36.104 [4] and TS 38.104 [17]. Option 2 also corresponds to the UTRA spectrum emission mask as defined in TS 25.104 [2] with GSM related modifications.

Table 6.6.2.2-0: Applicability of operating band unwanted emission requirements for BC2 Wide Area BS

|  |  |  |
| --- | --- | --- |
| NR Band operation | Standalone NB-IoT carrier adjacent to the BS RF bandwidth edge or EUTRA or GSM supported | Applicable requirement table |
| None | Y/N | 6.6.2.2-1 (option 2) |
| In certain regions (NOTE 2), bands 3, 8 | N | 6.6.2.2-1 (option 2) |
| Any | Y | 6.6.2.2-1 (option 2) |
| Any below 1 GHz except for, in certain regions (NOTE 2), band 8 | N | 6.6.2.2-2a (option 1) |
| Any above 1 GHz except for, in certain regions (NOTE 2), band 3 | N | 6.6.2.2-2b (option 1) |
| NOTE 1: Void.  NOTE 2: Applicable only for operation in regions where Category B limits as defined in ITU-R Recommendation SM.329 [6] are used for which category B option 2 operating band unwanted emissions requirements as defined in TS 36.104 [4] and TS 38.104 [17] are applied. | | |

***<End of change2>***