**3GPP TSG-RAN4 Meeting #111 *R4-240xxxx***

**Fukuoka City, Fukuoka, Japan, 20th May 2024 - 24th May 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** | **2308** | **rev** | **1** | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | CR to TS 38.101-1: n100-n101 Car radio receiver requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NR\_HPUE\_FWVM\_R18-Core | | | | |  | ***Date:*** | | | 2024-05-13 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | In last RAN4#110bis meeting a WF (R4-2406715) was agreed to discuss potential options to capture any clarification on missing FRMCS n100/n101 cab-radio Rx requirements.  This CR is proposing one possible option.  As the interferer mentioned in ECC Decision(20)02 requirements could also be in the 15MHz around the bands n100/n101 edges, the note should be captured in both in-band and out of band blocking requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add a note in out of band blocking requirement for bands n100 and n101, referring to ECC Decision(20)02. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | It might be unclear to the reader that additional receiver requirements exist for cab radio device in bands n100 and n101. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 7.6.2, 7.6.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 the change>*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

For a specific reference, subsequent revisions do not apply.

For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[3] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[4] 3GPP TS 38.521-1: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".

[5] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".

[6] 3GPP TS 38.211: "NR; Physical channels and modulation".

[7] 3GPP TS 38.331: "Radio Resource Control (RRC) protocol specification".

[8] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[9] ITU-R Recommendation SM.329-10, "Unwanted emissions in the spurious domain".

[10] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[11] 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception;

[12] ETSI TS 102 792: "Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range".

[13] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

[14] 3GPP TS 37.213: “Physical layer procedures for shared spectrum channel access”.

[15] 3GPP TS 38.306: “NR; User Equipment (UE) radio access capabilities”.

[16] 3GPP TS 38.104: “NR; Base Station (BS) radio transmission and reception”.

[17] 3GPP TS 23.256: “Support of Uncrewed Aerial Systems (UAS) connectivity, identification and tracking; Stage 2”.

[18] ECC Decision(22)07, “Harmonised technical conditions for the usage of aerial UE for communications based on LTE and 5G NR in the bands 703-733 MHz, 832-862 MHz, 880-915 MHz, 1710-1785 MHz, 1920-1980 MHz, 2500-2570 MHz and 2570-2620 MHz harmonised for MFCN”, 18 November 22.

[19] ECC Decision(20)02: “Harmonised use of the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz and of the unpaired frequency band 1900-1910 MHz for Railway Mobile Radio (RMR)”

*<End of the change>*

*<Start of the change>*

### 7.6.2 In-band blocking

For NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.2-1 and Table 7.6.2-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.6.2-1: In-band blocking parameters for NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RX parameter** | **Units** | **Channel bandwidth (MHz)** | | | |
|  |  | **3** | **5, 10** | **15** | **20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100** |
| Power in transmission bandwidth configuration3 | dBm | REFSENS + 6 dB | | REFSENS + 7 dB | REFSENS + (9 + 10log10(BWChannel /20)) dB |
| BWinterferer | MHz | 3 | 5 | | |
| FIoffset, case 1 | MHz | 4.5 | 7.5 | | |
| FIoffset, case 2 | MHz | 7.5 | 12.5 | | |
| NOTE 1: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4.  NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz SCS.  NOTE 3: 10log10(x) is rounded to the next higher 0.5dB value. | | | | | |

Table 7.6.2-2: In-band blocking for NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR band | Parameter | Unit | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 |
|  | Pinterferer | dBm | -56 | -44 | -15 | -38 | -224 |
|  | Finterferer (offset) | MHz | -BWChannel/2 –  FIoffset, case 1  and  BWChannel/2 +  FIoffset, case 1 | ≤ -BWChannel/2 –  FIoffset, case 2  and  ≥ BWChannel/2 +  FIoffset, case 2 |  | -BWChannel/2-11 |  |
| n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n29, n31, n34, n38,n39, n40, n41, n483, n50, n51, n53, n54, n65, n66, n67, n70, n72, n74, n75, n76, n85, n91, n92, n93, n94, n100, n101, n106 | Finterferer | MHz | NOTE 2 | FDL\_low – 15  to  FDL\_high + 15 |  |  |  |
| n30 | Finterferer | MHz | NOTE 2 | FDL\_low – 15  to  FDL\_high + 15 |  | FDL\_low – 11 |  |
| n71 | Finterferer | MHz | NOTE 2 | FDL\_low – 12 to FDL\_high + 15 | FDL\_low – 12 |  |  |
| n105 | Finterferer | MHz | NOTE 2 | FDL\_low – 12  to  FDL\_high + 15 |  |  | FDL\_low – 7 |
| NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.  NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWChannel/2 – FIoffset, case 1; b: BWChannel/2 + FIoffset, case 1  NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1.  NOTE 4: For Band n105 channels overlapping the 612 - 617 MHz frequency range, Pinterferer is modified to -34 dBm.  NOTE 5: For SDL bands, requirements shall be applied only for CA band combination cases. | | | | | | | |

NOTE: For bands n100 and n101, additional requirements for wideband cab-radio receiver are specified in ECC Decision(20)02 [19].

*<End of the change>*

*<Start of the change>*

### 7.6.3 Out-of-band blocking

For NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3-1 and Table 7.6.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.6.3-1: Out-of-band blocking parameters for NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz**

|  |  |
| --- | --- |
| Channel bandwidth | Power in transmission bandwidth configuration [dBm] |
| 3 MHz | REFSENS + 6.0 dB |
| 5 MHz | REFSENS + 6.0 dB |
| 10 MHz | REFSENS + 6.0 dB |
| 15 MHz | REFSENS + 7.0 dB |
| 20 MHz | REFSENS + 9.0 dB |
| 25 MHz | REFSENS + 10.0 dB |
| 30 MHz | REFSENS + 11.0 dB |
| 35 MHz | REFSENS + 11.5 dB |
| 40 MHz | REFSENS + 12.0 dB |
| 45 MHz | REFSENS + 12.5 dB |
| 50 MHz | REFSENS + 13.0 dB |
| 60 MHz | REFSENS + 14.0 dB |
| 70 MHz | REFSENS + 14.5 dB |
| 80 MHz | REFSENS + 15.0 dB |
| 90 MHz | REFSENS + 15.5 dB |
| 100 MHz | REFSENS + 16.0 dB |
| NOTE:      The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4. | |

Table 7.6.3-2: Out of-band blocking for NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR band | Parameter | Unit | Range 1 | Range 2 | Range 3 |
|  | Pinterferer | dBm | -44 | -30 | -15 |
| n1, n2, n3,  n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n29, n30, n31, n34, n38, n39, n40, n41, n485, n50, n51, n536, n54, n65, n66, n67, n70, n71, n72, n74, n75, n76, n85, n91, n92, n93, n94, n100, n101, n105, n106 | Finterferer (CW) | MHz | -60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 6000 MHz.  NOTE 2: For band 51 the FDL\_high of band 50 is applied as FDL\_high for band 51. For band 50, the FDL\_low of band 51 is applied as FDL\_low for band 50.  NOTE 3: For band 76 the FDL\_high of band 75 is applied as FDL\_high for band 76. For band 75, the FDL\_low of band 76 is applied as FDL\_low for band 75.  NOTE 4: For UEs supporting both bands 38 and 41, the FDL\_high and FDL\_low of band 41 is applied as FDL\_high and FDL\_low for band 38.  NOTE 5: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1. The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 2700 MHz and FInterferer < 4800 MHz.  NOTE 6: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 2580 MHz and FInterferer < 2775 MHz.  NOTE 7 For UE supporting both bands 25 and 70, the FDL\_high of band 70 is applied as FDL\_high for band 25, and the FDL\_low of band 25 is applied as FDL\_low for band 70.  NOTE 8: For bands 91 and 93 the FDL\_high of bands 92 and 94 are applied as FDL\_high for bands 91 and 93. For bands 92 and 94, the FDL\_low of bands 91 and 93 are applied as FDL\_low for bands 92 and 94  NOTE 9: For SDL bands, requirements shall be applied only for CA band combination cases.  NOTE 10 For a UE supporting CA\_20A-28A and higher order band combinations in which CA\_20A-28A is a subset, the requirements for Band n20 and Band n28 apply with FDL\_low given by the lower limit of the restricted operating frequency range in Band n28 and FDL\_high by Band n20. | | | | | |

NOTE: For bands n100 and n101, additional requirements for wideband cab-radio receiver are specified in ECC Decision(20)02 [19].

*<End of the change>*