**3GPP TSG-RAN WG4 Meeting #111  *R4-2409923***

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

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.151** | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  |
| *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 38.151 on MIMO OTA performance requirements |
|  |  |
| ***Source to WG:*** | CAICT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_MIMO\_OTA\_enh-Perf |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | The MIMO OTA minimum requirements for bands n28, n5, n1, n261 are not specified. The additional criteria for bands < 1GHz were agreed to be modified.  |
|  |  |
| ***Summary of change:*** | The MIMO OTA minimum requirements for bands n28, n5, n1, n261 are added. The additional criteria for bands < 1GHz have been modified. |
|  |  |
| ***Consequences if not approved:*** | The MIMO OTA performance of NR UEs for bands n28, n5, n1, n261 cannot be verified. |
|  |  |
| ***Clauses affected:*** | 6.1.2, 6.2, 7.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS 38.551 CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | This is a revision of R4-2407655.  |

< start of change 1 >

### 6.1.2 Total Radiated Multi-antenna Sensitivity (TRMS)

The average TRMS of free space data mode portrait (FS DMP), free space data mode landscape (FS DML), and free space data mode screen up (FS DMSU), is defined as the FR1 MIMO OTA requirement. The averaging shall be done in linear scale for the TRMS results at these DUT positions, according to the formula:

 

where

 

Such that *MODE* is one of {*FS\_DMP, FS\_DML, FS\_DMSU*}, and {*PMODE,70,0, …, PMODE,70,11*} are the measured sensitivity values at each azimuth position at the 70% throughput outage.

If 1 azimuth position does not result in a defined measured sensitivity at 70% throughput, SMODE,70 is calculated using the 11 measured sensitivities and the maximum downlink RS-EPRE PRS-EPRE-MAX (substitution approach) for the one missing result. PRS-EPRE-MAX is the maximum downlink RS-EPRE supported by the test system. For bands > 1 GHz, PRS-EPRE-MAX is defined as -80dBm/15kHz (or equivalent -77dBm/30kHz) for FR1 MIMO OTA; for bands < 1 GHz, PRS-EPRE-MAX is defined as -78dBm/15kHz for FR1 MIMO OTA.

The TRMS shall be measured at the mid channel as specified in TS 38.508-1 subclause 4.3.1 [7]. The average TRMS shall be lower than the average TRMS requirements specified in Clause 6.2.

The additional criterion in azimuthal orientations shall be met:

- The EUT must meet 70% throughput in 11 of total 12 azimuthal orientations. If the EUT fails to meet this criterion even under maximum downlink power condition (i.e. PRS-EPRE-MAX), the EUT shall fail the FR1 MIMO OTA test.

- The EUT must meet 90% throughput in 10 of total 12 azimuthal orientations for bands > 1 GHz, and 8 of total 12 azimuthal orientations for bands < 1 GHz. If the EUT fails to meet this criterion even under maximum downlink power condition (i.e. PRS-EPRE-MAX), the EUT shall fail the FR1 MIMO OTA test.

< end of change 1 >

< start of change 2 >

## 6.2 Minimum requirement

FR1 TRMS minimum performance requirements for NR handheld UEs operating on SA mode in free space and the primary mechanical mode for 70% DL throughput with the corresponding measurement configurations (i.e., channel model and gNB configuration) specified in Annex C.1 and Annex E.1 are defined in Table 6.2-1.

Table 6.2-1: FR1 TRMS minimum performance requirements for NR handheld UEs operating on SA mode in free space and the primary mechanical mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR bands | Bandwidth [MHz] | MIMO layer | Channel model | Reference channel | TRMSaverage,70 |
| n1 | 10 | 4x4 | FR1 UMa CDL-C | R.PDSCH.1-2.4 FDD | -96.0 dBm/15kHz |
| n5 | 10 | 2x2 | FR1 UMi CDL-C | R.PDSCH.1-3.1 FDD | -88.0 dBm/15kHz |
| n28 | 10 | 2x2 | FR1 UMi CDL-C | R.PDSCH.1-3.1 FDD | -84.6 dBm/15kHz |
| n41 | 40 | 4x4 | FR1 UMa CDL-C | R.PDSCH.2-2.4 TDD | -93.3 dBm/30kHz |
| n78 | 40 | 4x4 | FR1 UMa CDL-C | R.PDSCH.2-2.4 TDD | -94.8 dBm/30kHz |
| n79 | 40 | 4x4 | FR1 UMa CDL-C | R.PDSCH.2-2.4 TDD |  |

< end of change 2 >

< start of change 3 >

## 7.2 Minimum requirement

FR2 MASC minimum performance requirements for power class 3 NR handheld UEs in free space and the primary mechanical mode for averaging of the best 18 sensitivity values for 70% DL throughput with the corresponding measurement configurations (i.e., channel model and gNB configuration) specified in Annex D.1 and Annex E.2 are defined in Table 7.2-1.

Table 7.2-1: FR2 MASC minimum performance requirements for NR handheld UEs in free space and the primary mechanical mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR bands | Bandwidth [MHz] | MIMO layer | Channel model | Reference channel | MASC70 [dBm/120kHz] |
| n257 | 100 | 2x2 | FR2 UMi CDL-C | R.PDSCH.5-2.2 TDD |  |
| n258 | 100 | 2x2 | FR2 UMi CDL-C | R.PDSCH.5-2.2 TDD |  |
| n260 | 100 | 2x2 | FR2 UMi CDL-C | R.PDSCH.5-2.2 TDD |  |
| n261 | 100 | 2x2 | FR2 UMi CDL-C | R.PDSCH.5-2.2 TDD | -100.0 |

< end of change 3 >