**3GPP TSG-WG4 Meeting #102-e *R4-2206575***

**Electronic Meeting, Feb 21- Mar 03, 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** | **1024** | **rev** | **1** | **Current version:** | **17.4.0** |  |
|  | | | | | | | | |
| *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:*** | Big CR for TS38.101-1: introduction of new UL MIMO bands | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_bands\_UL\_MIMO\_PC3\_R17-Core | | | | |  | ***Date:*** | | | 2022-02-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce completed bands supporting UL MIMO  **RAN4#101-bis-e**  R4-2201759  UL-MIMO WID for revised to specify support for recently introduced n24 and n99 bands  **RAN4#102-e**  R4-2206482  RAN4 approved the contribution R4-2117308 in meeting # 101-e for proposal to support NR band n77/n78 with UL-MIMO for PC1.5 UE in Rel-17. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | **RAN4#101-bis-e**  R4-2201759  Includes n24 and corresponding SUL band n99 as bands supporting UL MIMO, UL MIMO MOP for n24 and n99.  **RAN4#102-e**  R4-2206482  Update the section 6.2D.1 for UE power class PC1.5 for UL MIMO for n77 and n78. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The proposed operating bands in the Rel-17 WI cannot support UL MIMO. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2D, 6.2D.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-1 | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Add the agreed bands in the endorsed CR R4-2206482. | | | | | | | | |

## **<Start of Change>**

## 5.2D Operating bands for UL MIMO

NR is designed to support UL MIMO where all of the operating bands are in FR1 defined in Table 5.2D-1.

Table 5.2D-1: NR operating bands for UL MIMO in FR1

|  |
| --- |
| NR operating band |
| n1 |
| n2 |
| n3 |
| n7 |
| n24 |
| n25 |
| n301 |
| n34 |
| n38 |
| n39 |
| n40 |
| n41 |
| n46 |
| n48 |
| n66 |
| n70 |
| n712 |
| n77 |
| n78 |
| n79 |
| n80 |
| n84 |
| n95 |
| n96 |
| n97 |
| n98 |
| n99 |
| NOTE 1: Uplink transmission is not allowed at this band for UE with external vehicle-mounted antennas.  NOTE 2: UL MIMO is targeted for FWA form factor. |

## **<Next Change>**

### 6.2D.1 UE maximum output power for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power for any transmission bandwidth within the channel bandwidth is specified in Table 6.2D.1-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors. The period of measurement shall be at least one sub frame (1 ms).

The requirements shall be met with the UL MIMO configurations of using 2-layer UL MIMO transmission with codebook of. DCI Format for UE configured in PUSCH transmission mode for uplink single-user MIMO shall be used.

Table 6.2D.1-1: UE Power Class for UL MIMO in closed loop spatial multiplexing scheme

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR band | Class 1.5 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
| n1 |  |  |  |  | 23 | +2/-3 |  |  |
| n2 |  |  |  |  | 23 | +2/-31 |  |  |
| n3 |  |  |  |  | 23 | +2/-31 |  |  |
| n7 |  |  |  |  | 23 | +2/-31 |  |  |
| n24 |  |  |  |  | 23 | +2/-41 |  |  |
| n25 |  |  |  |  | 23 | +2/-31 |  |  |
| n30 |  |  |  |  | 23 | +2/-3 |  |  |
| n34 |  |  | 26 | +2/-3 | 23 | +2/-3 |  |  |
| n38 |  |  |  |  | 23 | +2/-3 |  |  |
| n39 |  |  | 26 | +2/-3 | 23 | +2/-3 |  |  |
| n40 |  |  |  |  | 23 | +2/-3 |  |  |
| n41 | 29 | +2/-31 | 26 | +2/-31 | 23 | +2/-31 |  |  |
| n48 |  |  |  |  | 23 | +2/-3 |  |  |
| n66 |  |  |  |  | 23 | +2/-3 |  |  |
| n70 |  |  |  |  | 23 | +2/-3 |  |  |
| n71 |  |  |  |  | 23 | +2/-3 |  |  |
| n77 | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| n78 | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| n79 | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| n80 |  |  |  |  | 23 | +2/-31 |  |  |
| n84 |  |  |  |  | 23 | +2/-3 |  |  |
| n95 |  |  |  |  | 23 | +2/-3 |  |  |
| n97 |  |  |  |  | 23 | +2/-3 |  |  |
| n98 |  |  |  |  | 23 | +2/-3 |  |  |
| n99 |  |  |  |  | 23 | +2/-41 |  |  |
| NOTE 1: The transmission bandwidths confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high – 4 MHz and FUL\_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB  NOTE 2: Power class 3 is the default power class unless otherwise stated | | | | | | | | |

## **<End of Change>**