**3GPP TSG-RAN4 Meeting #106bis-e *R4-230xxxx***

**Online, April 17 – April 26, 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-1** | **CR** | draft | **rev** |  | **Current version:** | **18.1.0** |  |
|  |
| *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:***  | draft CR on NR-U PC3 UL-MIMO |
|  |  |
| ***Source to WG:*** | LG Electronics |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_unlic\_enh-Core |  | ***Date:*** | 2023-04-09 |
|  |  |  |  |  |
| ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | UL-MIMO for NR-U PC3 is necessary to be specified In Rel-18. |
|  |  |
| ***Summary of change:*** | Introduce UL-MIMO requirements for NR-U PC3 on top of the endorsed draft CR (R4-2303482).* 6.2F.1D UE maximum output power for UL MIMO
* 6.2F.2D UE maximum output power reduction for UL MIMO
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| ***Consequences if not approved:*** | UL-MIMO for NR-U PC3 is missed in Rel-18. |
|  |  |
| ***Clauses affected:*** |  6.2F.1D, 6.2F.2D |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS38.521-1 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

< START OF CHANGE #1 >

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NRband | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
| n46 |  |  |  |  | 23 | +2/-3 | 20 | +2/-3 |
| n96 |  |  |  |  | 23 | +2/-3 | 20 | +2/-3 |
| n102 |  |  |  |  | 23 | +2/-3 | 20 | +2/-3 |
| NOTE 1: Powerclass 5 is default power class unless otherwise stated. |

For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the maximum output power requirements specified in Table 6.2F.1D-1 shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE’s support of uplink full power transmission mode.

< END OF CHANGE #1 >

< START OF CHANGE #2 >

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2F.1D-1 is specified in Table 6.2F.2-1 for power class 5, and in Table 6.2F.2-3 and Table 6.2F.2-4 for power class 3. The requirements shall be met with UL MIMO configurations defined 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.

For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the allowed MPR for the maximum output power in Table 6.2F.1D-1 is specified in Table 6.2F.2-1 for power class 5, and in Table 6.2F.2-3 and Table 6.2F.2-4 for power class 3, and the requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE’s support of uplink full power transmission mode.

The same MPR requirements shall be applicable to UE with 1-layer UL MIMO transmission (either with or without ULPFTx) as with the UL MIMO configurations of using 2-layer UL MIMO transmission with codebook of.

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2D.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission, the requirements in clause 6.2F.2 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

< END OF CHANGE #2 >