**3GPP TSG-RAN WG4 Meeting #116R4-2509464**

**Bengaluru, India, 25th -29th September, 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | 38.101-1 | **CR** | 2883 | **rev** |  | **Current version:** | 19.2.0 |  |
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| *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:***  | (NR\_ATG\_enh-Core) draft CR on ATG UE MOP requirement |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_ATG\_enh-Core |  | ***Date:*** | 2025-08-15 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-19 |
|  | *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:*** | MOP requirements for CA and MIMO need to be added for ATG UE. |
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| ***Summary of change:*** | MOP requirements for CA and MIMO are added for ATG UE. |
|  |  |
| ***Consequences if not approved:*** | MOP requirement for CA and MIMO is missing. |
|  |  |
| ***Clauses affected:*** | New section 6.2J.3; 6.2J.4 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **x** |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## 6.2J Transmitter power for ATG

### 6.2J.1 UE maximum output power for ATG

For the ATG UE, the rated maximum output power is reported via UE capability *maxOutputPowerATG-r18* at maximum modulation order reported by ATG UE and full PRB configurations within the channel bandwidth of NR carrier unless otherwise stated. The period of measurement shall be at least one sub frame (1ms). UE capability *maxOutputPowerATG-r18* is an integer value in the range 23 to 40 dBm.

For ATG UE with multiple omni-directional antennas not indicating the capability *antennaArrayType-r18,* the measured maximum output powerPmax,c,AC shall remain within +2 dB and -2 dB of the rated maximum output power Prated,c,AC reported by the ATG UE.

For ATG UE with antenna array indicating the capability *antennaArrayType-r18,* the measured maximum output powerPmax,c,TABC shall remain within +2 dB and -2 dB of the rated maximum output powerPrated,c,TABC reported by the ATG UE.

### 6.2J.1A Transmtter power for CA

### 6.2J.1A.0 General

UE can indicate rated output power for the single configured UL CC with DL CA as specified in 6.2J.1 and if UE supports UL MIMO in this carrier, UE can indicate rated output power for the CA configuration as specified in 6.2J.4D.

### 6.2J.1A.1 UE maximum output power for CA

#### 6.2J.1A.1.1 UE maximum output power for Intra-band contiguous CA

For downlink intra-band contiguous carrier aggregation with a single uplink component carrier configured in the NR band, the rated output power specified in 6.2J.1 apply.

#### 6.2J.1A.1.2 UE maximum output power for Inter-band CA

For inter-band downlink carrier aggregation with one uplink carrier assigned to one NR band, the transmitter power requirements in 6.2J.1 apply.

#### 6.2J.1A.1.3 ΔTIB,c for CA

For the UE which supports inter-band NR CA configuration, ΔTIB,c in tables below applies. Unless otherwise stated, ΔTIB,c is set to zero.

##### 6.2J.1A.1.3.1 ΔTIB,c for Inter-band CA (two bands)

Table 6.2J.1A.1.3.1-1: ΔTIB,c due to NR CA (two bands)

| Inter-band CA combination | ΔTIB,c for NR bands (dB) |
| --- | --- |
| Component band in order of bands in configuration |
| CA\_n3-n39 | 0.5 | 0.5 |

### 6.2J.1D Transmitter power for UL-MIMO

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

For UE supporting UL MIMO, the rated maximum output power is defined as the sum of the rated maximum output power from all UE antenna connectors or all UE TAB connectors, which is reported via UE capability *maxOutputPowerATG-r18* at maximum modulation order reported by ATG UE and full PRB configurations within the channel bandwidth of NR carrier unless otherwise stated. The period of measurement shall be at least one sub frame (1 ms). UE capability *maxOutputPowerATG-r18* is an integer value in the range 23 to 40 dBm.

* For ATG UE with multiple omni-directional antennas not indicating the capability *antennaArrayType-r18,* the measured maximum output power over all UE antenna connectors Pmax,c,AC shall remain within +2 dB and -2 dB of the rated maximum output power Prated,c,AC reported.
* For ATG UE with antenna array indicating the capability *antennaArrayType-r18,* the measured maximum output power over all UE TAB connectorsPmax,c,TABC shall remain within +2 dB and -2 dB of the rated maximum output powerPrated,c,TABC reported.

For ~~UE with two or four transmit antenna connectors in~~ closed-loop spatial multiplexing with dual layers~~scheme~~, the trequirements shall be met with the UL MIMO configurations specified in Table 6.2J.1D.1-1. The requirements shall be met with the UL MIMO configurations of using 2-layer UL MIMO codebook-based transmission with precoding matrix of *W=*. DCI Format for UE configured in PUSCH transmission mode for uplink single-user MIMO shall be used.

Table 6.2J.1D.1-1: UL MIMO configuration in closed-loop spatial multiplexing scheme

|  |  |  |  |
| --- | --- | --- | --- |
| Transmission scheme | DCI format  | Number of layers | TPMI index |
| Codebook based uplink | DCI format 0\_1 | 2 | 0 |
| NOTE 1: The UE is configured with one SRS resource with the parameter *nrofSRS-Ports* set to 2. |

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the rated output power requirements shall be met with the PUSCH configurations specified in Table 6.2J.1D.1-2, based upon UE’s support of uplink full power transmission mode.

Table 6.2J.1D.1-2: PUSCH Configuration for uplink full power transmission (ULFPTx)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ULFPTx Mode | Transmission scheme | DCI format  | Modulation | Number of layers | Number of Tx Port | TPMI index |
| Mode-1 | Codebook based uplink | DCI format 0\_1 | DFT-s-OFDM, CP-OFDM NOTE3 | 1 | 2 NOTE1 | 2 |
|  |  |  |  |  | 4 NOTE4 | 13 |
|  |  |  | CP-OFDM NOTE3 | 2 | 4 | 6 |
| Mode-2 | Codebook based uplink | DCI format 0\_1 | DFT-s-OFDM, CP-OFDM | 1 | 2 NOTE1 | 0 or 1NOTE2 |
|  |  |  |  |  | 4 NOTE4 | 4, 5, 6 ,7 or 4, 5, 6 ,7, 8, 9, 10, 11NOTE2 |
|  |  |  | CP-OFDM | 2 | 4 | 1 or 0, 1, 2, 3, 4 ,5NOTE2 |
| Mode-full power | Codebook based uplink | DCI format 0\_1 | DFT-s-OFDM, CP-OFDM | 1 | 2 NOTE1 | 0,1 |
| NOTE 1: The UE is configured with one SRS resource with the parameter *nrofSRS-Ports* set to 2.NOTE 2: TPMI index selected shall be based upon the full power TPMI reported by the UE [8, TS 38.213].NOTE 3: For PUSCH configured with *ul-FullPowerTransmission* set to *fullpowerMode1*, all the transmitter requirement for CP-OFDM based modulation does not need to be verified if the requirements for 2-layer or 4-layer UL MIMO according to Table 6.2D.1-2 has been verified.NOTE 4: The UE is configured with one SRS resource with the parameter *nrofSRS-Ports* set to 4. |

If the UE is scheduled for single ~~antenna-port~~ layer PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for codebook based transmission with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.2J.1 apply for at least one antenna connector for rated output power as indicated by the *ue-PowerClass* field in capability signalling with the following exception: for UEs indicating Tx diversity capability, the requirements in clause 6.2G for rated output power indicated by the *maxOutputPowerATG-r18*.

A UE with 2Tx indicating the feature *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for a band shall meet the requirement in clause 6.2J.1 for at least one antenna connector when scheduled for single antenna-port transmission by DCI format 0\_0 or by DCI format 0\_1 for codebook-based transmission with precoding matrix *W*=1 [6.3.1.5 TS 38.211].

### 6.2J.2 Configured transmitted power for ATG

The UE is allowed to set its configured maximum output power PCMAX,f,c for carrier f of serving cell c in each slot. The configured maximum output power PCMAX,f,c is set within the following bounds:

PCMAX\_L,f,c ≤ PCMAX,f,c ≤ PCMAX\_H,f,c with

PCMAX\_L,f,c = MIN {PEMAX,c, Prated,c,AC or Prated,c,TABC}

PCMAX\_H,f,c = PEMAX,c

where

 PEMAX,c is the value given by ATG specific the *p-Max* IE or the field *additionalPmax* of the *NR-NS-PmaxList IE]*, whichever is applicable according to TS 38.331[7]; It’s noted that the actual PEMAX,c value is (9 + field value) in ATG cell, according to *p-Max* IE definition in TS 38.331 [7];

 Prated,c,AC is the rated maximum output power at maximum modulation order and full PRB configurations which is indicated by ATG UE capability *maxOutputPowerATG-r18* for ATG UE with multiple omni-directional antennas not indicating the capability *antennaArrayType-r18*;

Prated,c,TABC is the rated maximum output power at maximum modulation order and full PRB configurations which is indicated by ATG UE capability *maxOutputPowerATG-r18* for ATG UE with antenna array indicating the capability *antennaArrayType-r18*.

TREF and Teval are specified in Table 6.2J.2-0. For each TREF, the PCMAX,L,c for serving cell c are evaluated per Teval and given by the minimum value taken over the transmission(s) within the Teval; the minimum PCMAX\_L,f,c over one or more Teval is then applied for the entire TREF

Table 6.2J.2-0: Evaluation and reference periods for Pcmax

|  |  |  |
| --- | --- | --- |
| TREF | Teval | Teval with frequency hopping |
| Physical channel length | Physical channel length | Min(*Tno\_hopping*, Physical Channel Length) |

The measured configured maximum output power PUMAX,f,c shall be within the following bounds:

 PCMAX\_L,f,c – T(PCMAX\_L,f,c) ≤ PUMAX,f,c ≤ PCMAX\_H,f,c + T(PCMAX\_H,f,c).

where the tolerance T(PCMAX,f,c) for applicable values of PCMAX,f,c is specified in Table 6.2J.2-1.

Table 6.2J.2-1: ATG PCMAX tolerance

|  |  |
| --- | --- |
| PCMAX,f,c (dBm) | Tolerance T(PCMAX,f,c) (dB) |
| 23 < PCMAX,c ≤ 40 | 2.0 |
| 21 ≤ PCMAX,c ≤ 23 | 2.0 |
| 20 ≤ PCMAX,c < 21 | 2.5 |
| 19 ≤ PCMAX,c < 20 | 3.5 |
| 18 ≤ PCMAX,c < 19 | 4.0 |
| 13 ≤ PCMAX,c < 18 | 5.0 |
| 8 ≤ PCMAX,c < 13 | 6.0 |
| -19 ≤ PCMAX,c < 8 | 7.0 |

### 6.2J.2D Configured transmitted power for UL MIMO

For ATG UE supporting UL MIMO, the transmitted power is configured per each UE.

The definitions of configured maximum output power PCMAX,*c*, the lower bound PCMAX\_L,*c*, and the higher bound PCMAX\_H,*c* specified in clause 6.2J.2 shall apply to UE supporting UL MIMO.

The measured configured maximum output power PUMAX,*c* for serving cell *c* shall be within the following bounds:

PCMAX\_L,*c*– MAX{TL, T LOW(PCMAX\_L,*c*)} ≤ PUMAX,*c* ≤ PCMAX\_H,*c*+ T HIGH(PCMAX\_H,*c*)

where TLOW(PCMAX\_L,*c*) and THIGH(PCMAX\_H,*c*) are defined as the tolerance and applies to PCMAX\_L,*c* and PCMAX\_H,*c* separately, while TL is the absolute value of the lower tolerance in 6.2J.1.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the tolerance is specified in Table 6.2J.2D-1. The requirements shall be met with UL MIMO configurations specified in Table 6.2J.1-1.

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the tolerance is specified in Table 6.2J.2D-1. The requirements shall be met with the PUSCH configurations specified in Table 6.2J.1-2, based upon UE’s support of uplink full power transmission mode.

Table 6.2J.2D-1: PCMAX,*c* tolerance in closed-loop spatial multiplexing scheme

|  |  |  |
| --- | --- | --- |
| PCMAX,*c*(dBm) | ToleranceTLOW(PCMAX\_L,*c*) (dB) | ToleranceTHIGH(PCMAX\_H,*c*) (dB) |
| 23 ≤ PCMAX,*c* ≤ 40 | 3.0 | 2.0 |
| 21 ≤ PCMAX,*c* < 23 | 5.0 | 2.0 |
| 20 ≤ PCMAX,*c* < 21 | 5.0 | 4.0 |
| 19 ≤ PCMAX,*c* < 20 | 3.5 |
| 18 ≤ PCMAX,*c* < 19 | 4.0 |
| 13 ≤ PCMAX,*c* < 18 | 5.0 |
| 18 ≤ PCMAX,*c* < 13 | 6.0 |
| -19 ≤ PCMAX,*c* < 8 | 7.0 |

If the 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 corresponding requirements in clause 6.2J.4D.1 apply for the rated output power as indicated by the *maxOutputPowerATG-r18* field in capability signaling.