**3GPP TSG-RAN4 Meeting #116R4-2511786**

**Bengaluru,** **India, August 25th – 29th2025**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** |  | **rev** | **1** | **Current version:** | **19.2.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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 to TS 38.101-1: the introduction of ATG UE in clause 6.3J and 6.4J | | | | | | | | | |
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| ***Source to WG:*** | ZTE Corporation | | | | | | | | | |
| ***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 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:*** | | RF requirement for ATG UE in Rel-19 is still missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | According to the work split, this CR is to capture the requirement for output dynamic range and transmitter signal quality requirement for ATG UE supporting UL MIMO. | | | | | | | | |
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| ***Consequences if not approved:*** | | The requirement is not complete for ATG UE in Rel-19. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3J and 6.4J | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Revised from R4-2511131 | | | | | | | | |

## 6.3J Output power dynamics for ATG

### 6.3J.1 Minimum output power for ATG

The minimum controlled output power of the UE is defined as the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks) when the power is set to a minimum value.

The minimum output power is defined as the sum of the mean power from all antenna connectors or all TAB connectors in at least one sub-frame (1 ms). The minimum output power shall not exceed the values specified in Table 6.3J.1-1for ATG UE with omni-directional antenna and in Table 6.3J.1-2 for ATG UE with antenna array.

Table 6.3J.1-1: Minimum output power for ATG UE with omni-directional antenna

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | (MHz) | 5,10,15,20 | 25,30,35,40,45,50 | 60,70,80,90,100 |
| REF\_SCS | (kHz) | 15 | | 30 |
| Minimum output power | (dBm) | -15 | -15+10log10 (BWChannel /20) | -15+10log10 (BWChannel /20) |
| Measurement bandwidth | (MHz) | MBW=REF\_SCS\*(12\*NRB+1)/1000 | | |
| NOTE: The minimum output power value is rounded to the nearest number down to one decimal point. | | | | |

Table 6.3J.1-2: Minimum output power for ATG UE with antenna array

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel bandwidth | (MHz) | 5,10,15,20 | 25,30,35,40,45,50 | 60,70,80,90,100 |
| REF\_SCS | (kHz) | 15 | | 30 |
| Minimum output power | (dBm) | -19 | -19+10log10 (BWChannel /20) | -19+10log10 (BWChannel /20) |
| Measurement bandwidth | (MHz) | MBW=REF\_SCS\*(12\*NRB+1)/1000 | | |
| NOTE: The minimum output power value is rounded to the nearest number down to one decimal point. | | | | |

*<Start of the change>*

### 6.3J.1D Output power dynamics for ATG UE with UL MIMO

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer), the minimum output power is defined as the sum of the mean power from all antenna connectors or all TAB connectors in one sub-frame (1 ms). The minimum output power shall not exceed the values specified in Table 6.3J.1-1.

If ATG 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 with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.3J.1 apply when *TxD* is not indicated.

*<Next of the change>*

### 6.3J.2 Transmit OFF power for ATG

The transmit OFF power is defined as the mean power at each transmit antenna connector or each TAB connector in a duration of at least one sub-frame (1 ms) excluding any transient periods.

The transmit OFF power requirements as specified in clause 6.3.2 are applicable for ATG UE.

*<Next of the change>*

### 6.3J.2D Transmit OFF power for ATG UE with UL MIMO

The transmit OFF power is defined as the mean power at each transmit antenna connector or each TAB connector in a duration of at least one sub-frame (1 ms) excluding any transient periods.

The transmit OFF power requirements as specified in clause 6.3J.2 are applicable for ATG UE with UL MIMO.

*<Next of the change>*

### 6.3J.3 Transmit ON/OFF time mask for ATG

The transmit ON/OFF time mask requirements as specified in clause 6.3.3 are applicable for ATG UE at each transmit antenna connector or each TAB connector.

*<Next of the change>*

### 6.3J.3D Transmit ON/OFF time mask for ATG UE with UL MIMO

The transmit ON/OFF time mask requirements as specified in clause 6.3.3 are applicable for ATG UE at each transmit antenna connector or each TAB connector.

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer) in closed-loop spatial multiplexing scheme, the general ON/OFF time mask requirements specified in clause 6.3J.3 apply to each transmit antenna connector or each TAB connector. The requirements shall be met with the UL MIMO configurations described in clause 6.2D.1.

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 with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.3J.3 apply when *TxD* is not indicated, and the requirements in clause 6.3G.3 apply when *TxD* is indicated.

*<Next of the change>*

### 6.3J.4 Power control for ATG

The power control requirements specified in clause 6.3.4 are applicable to the sum of output power at each transmit antenna connector for UE with omnidirectional antenna(s) or to the sum of output power at each transceiver array boundary (TAB) connectors for UE with antenna array for ATG UE.

*<Next of the change>*

### 6.3J.4D Power control for ATG UE with UL MIMO

For ATG UE supporting UL MIMO, the power control tolerance applies to the sum of output powers from all transmit antenna connectors of ATG UE with omni-directional antenna or the sum of output powers from all TAB connectors of ATG UE with antenna array .

The power control requirements specified in clause 6.3J.4 apply to ATG UE with all transmit antenna connectors or all TAB connectors in closed-loop spatial multiplexing scheme. The requirements shall be met with UL MIMO configurations described in clause 6.2J.1.

If ATG 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 with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.3J.4 apply when *TxD* is not indicated.

*<Next of the change>*

## 6.4J Transmit signal quality for ATG

*<Next of the change>*

### 6.4J.0 Reserved

### 6.4J.0D General

For a ATG UE supporting UL MIMO, the requirements in this section are defined per layer or as the sum of emissions from all UE antennas to account for the UL MIMO scheme.

Alternatively, when applicable, requirements may be verified per layer using 2-layer UL MIMO transmission with codebook of, and a configuration defined in Table 6.4J.0D-1.

Table 6.4J.0D-1: UL MIMO configuration for per connector measurements

|  |  |  |
| --- | --- | --- |
| Transmission scheme | DCI format | Codebook Index |
| Codebook based uplink | DCI format 0\_1 | Codebook index 0 |

*<Next of the change>*

### 6.4J.1 Frequency error for ATG

The ATG UE basic measurement interval of modulated carrier frequency is 1 UL slot. The ATG UE pre-compensates the uplink modulated carrier frequency by the estimated Doppler shift. The mean value of basic measurements of ATG UE modulated carrier frequency per layer at each transmit antenna connector for UE with omni-directional antenna(s) or at each transceiver array boundary (TAB) connector for UE with antenna array shall be accurate to within ± 0.1 PPM observed over a period of 1 ms of cumulated measurement intervals compared to ideally pre-compensated reference uplink carrier frequency.

UE [shall] rely on the ATG BS location broadcasted by the SIB22 in TS 38.331 [7].

NOTE 1: the ideally pre-compensated reference uplink carrier frequency consists of the UL carrier frequency signalled to the UE by ATG BS and UL precompensated doppler frequency shift.

*<Next of the change>*

### 6.4J.1D Frequency error for ATG UE with UL MIMO

For ATG UE supporting UL MIMO, the frequency error requirement as specified in clause 6.4J.1 apply per layer.

*<Next of the change>*

### 6.4J.2 Transmit modulation quality for ATG

The requirements for transmit modulation quality defined in clause 6.4.2 shall apply for ATG UE at each transmit antenna connector for UE with omni-directional antenna(s) or at each transceiver array boundary (TAB) connector for UE with antenna array, except for the phase continuity requirements for DMRS bundling in 6.4.2.5. The requirements for 256QAM modulation are only applicable to ATG UE indicating support of 256QAM.

*<Next of the change>*

### 6.4J.2D Transmit modulation quality for ATG UE with UL MIMO

#### 6.4J.2D.0 General

For ATG UE supporting UL MIMO, general description for transmit modulation quality as specified in clause 6.4D.2.0 apply.

#### 6.4J.2D.1 Error Vector Magnitude for ATG UE with UL MIMO

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer) in closed-loop spatial multiplexing scheme, the Error Vector Magnitude requirements specified in clause 6.4.2.1 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table Table 6.2J.1D.1-1.

#### 6.4J.2D.2 Carrier leakage for ATG UE with UL MIMO

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer) in closed-loop spatial multiplexing scheme, the Relative Carrier Leakage Power requirements specified in Table 6.4.2.2-1 which is defined in clause 6.4.2.2 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table Table 6.2J.1D.1-1.

#### 6.4J.2D.3 In-band emissions for ATG UE with UL MIMO

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer) in closed-loop spatial multiplexing scheme, the In-band Emission requirements specified in Table 6.4.2.3-1 which is defined in clause 6.4.2.3 apply at each transmit antenna connector or each TAB connector. The requirements shall be met with the UL MIMO configurations specified in Table Table 6.2J.1D.1-1.

#### 6.4J.2D.4 EVM equalizer spectrum flatness for ATG UE with UL MIMO

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer) in closed-loop spatial multiplexing scheme, the EVM Equalizer Spectrum Flatness requirements specified in clause 6.4.2.4 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table Table 6.2J.1D.1-1.

### 6.4J.3D Time alignment error for ATG

#### 6.4J.3D.1 Time alignment error for ATG UE with UL MIMO

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer) supporting UL MIMO, this requirement applies to frame timing differences between transmissions on two transmit antenna connectors or TAB connectors. The time alignment error (TAE) is defined as the average frame timing difference between any two transmissions on different transmit antenna connectors or TAB connectors belonging to different groups (each of which supporting one layer).

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer), the Time Alignment Error (TAE) shall not exceed 130 ns.

### 6.4J.4D Coherent UL MIMO requirement for ATG

For ATG UE with two transmit antenna connectors or two groups of TAB connectors (each of which supporting one layer), the requirements for coherent UL MIMO as specified in clause 6.4D.4 apply.

*<End of the change>*