**3GPP TSG-RAN WG4 Meeting # 109 R4-2318139**

Chicago, US, November 13 – November 17, 2023

**Agenda item:** 8.13.9

**Source:** Moderator (Huawei)

**Title:** Topic summary for [109][133] NR\_ATG\_UERF\_part2

**Document for:** Information

# Introduction

This agenda item will handle all contributions related to NR ATG UE RF requirements with the following sub-topics.

1. ATG UE RF requirements

The other TPs and draft CRs will be treated online. It’s encouraged for companies to prepare the comments and send them offline to contact person as soon as possible.

# Topic #1: ATG UE RF requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2318919**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318919.zip) | CMCC | **Proposal 1: it’s suggested to approve above UE RF feature list.**  **Feature group:**   1. **Omni-directional antenna type** 2. **Antenna array type** 3. **Rated max output power** 4. **ATG specific P-max** |
| [**R4-2318638**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318638.zip) | Apple | CR on output power dynamics and Tx signal qulity for ATG UE |
| [**R4-2318917**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318917.zip) | CMCC | Draft CR for TS 38.101-1 to update omni-directional and antenna array terminology |
| [**R4-2318920**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318920.zip) | CMCC | TP for TR 38.876 to add conclusion part and update omni-directional terminology and other description |
| [**R4-2318922**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318922.zip) | CMCC | Big CR for TS 38.101-1 for NR ATG |
| [**R4-2319797**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319797.zip) | Ericsson | Draft CR for TS 38.101-1 to introduce spurious response, intermodulation, and spurious emission for ATG UE for ATG UE |
| [**R4-2319798**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319798.zip) | Ericsson | TP to TR 38.876 on intermodulation characteristics |
| [**R4-2319881**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319881.zip) | Huawei, HiSilicon | TP for TR 38.876 to maintain the Tx RF requirements for ATG UE |
| [**R4-2319882**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319882.zip) | Huawei, HiSilicon | TP for TR 38.876 to introduce some Rx requirements |
| [**R4-2319883**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319883.zip) | Huawei, HiSilicon | **Proposal 1: To reuse the wordings in RAN4#108bis meeting way forward.** 6.5J.2.2 Spectrum emission mask If ATG UE output power is less than or equal to 31dBm, the FR1 UE SEM mask specified in TS 38.101-1 apply.  If ATG UE output power is larger than 31dBm, the FR1 UE SEM mask specified in TS 38.101-1 shall be relaxed by the scaling factor (ATG UE output power – 31) dB.  NOTE: This scaling factor is only applicable to ATG airborne UE. |
| [**R4-2319884**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319884.zip) | Huawei, HiSilicon | Draft CR for TS 38.101-1 to introduce ATG UE RF requirements part 1 |
| [**R4-2320326**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320326.zip) | ZTE Corporation | draft CR to TS 38.101-1: clause 6.5J,7.1J,7.2J |
| [**R4-2320376**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320376.zip) | Qualcomm Incorporated | TP to TR 38.876 on ATG UE Maximum input level |
| [**R4-2320377**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320377.zip) | Qualcomm Incorporated | Draft CR for TS 38.101-1 to introduce ATG UE RF Rx requirements - part 1 |
|  |  |  |

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 Remaining issues

*Sub-topic description:*

*Open issues and candidate options before f2f meeting:*

**Issue 1-1-1: Discussion on how to specify SEM requirements for ATG UE**

* **Proposal:** 
  + Option 1: Proposal in R4-2319883.

#### 6.5J.2.2 Spectrum emission mask

If ATG UE output power is less than or equal to 31dBm, the FR1 UE SEM mask specified in TS 38.101-1 apply.

If ATG UE output power is larger than 31dBm, the FR1 UE SEM mask specified in TS 38.101-1 shall be relaxed by the scaling factor (ATG UE output power – 31) dB.

NOTE: This scaling factor is only applicable to ATG airborne UE.

* + Option 2: Proposal in R4-2320326

#### 6.5J.2.2 Spectrum emission mask

If rated maximum output power of ATG UE is less than or equal to 31dBm, the requirements for spectrum emission mask in clause 6.5.2.2 apply; if[ rated maximum output power] of ATG UE is larger than 31dBm, the requirements of spectrum emission mask in clause 6.5.2.2 shall be relaxed with scaling factor equal to (rated maximum output power minus 31) dB.

NOTE: This scaling factor is only applicable to ATG airborne UE. If the transmission power is lower than rated maximum output power at maximum modulation order, then scaling factor should comply with the actual transmission power.

* + Option 3: Others
* Recommended WF
  + TBA

**.**

### Sub-topic 1-2 ATG UE feature list

**Issue 1-2-1: Discussion on ATG UE feature list**

**Proposal: to approve the following UE RF feature list**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between UEs (V2X WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type**  **(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| 35. NR\_ATG |  | **Omni-directional antenna type** | Indicate the support of RF and RRM requirements with omni-directional antenna as specified in TS 38.101-1 section 6.1J, 7.1J and TS 38.133. |  | yes | N/A | If UE does not support omni-directional antenna type, the corresponding requirements cannot be guaranteed. | 1. Per Band | No | FR1 only | N/A | For one band, if UE does not report support of omni-directional antenna type, UE should report support of antenna array type. | Optional with capability signaling |
|  | **Antenna array type** | Indicate the support of RF and RRM requirements with antenna array as specified in TS 38.101-1 section 6.1J, 7.1J and TS 38.133. |  | yes | N/A | If UE does not support antenna array type, the corresponding requirements cannot be guaranteed. . | 2)Per Band | No | FR1 only | N/A | For one band, if UE does not report support of antenna array type, UE support of omni-directional antenna type. | Optional with capability signaling |
|  | **Rated max output power** | Indicate the support of rated maximum output power at maximum modulation order and full PRB configurations |  | yes | N/A | If UE does not support the capability, network does not know ATG UE’s maximum output power. | 2)Per band | No | FR1 only | N/A | Value range from 23dBm to 40dBm with 1dB as granularity | Mandatory with capability signaling |
|  | **ATG specific P-max** | Indicate the support of ATG specific P-max configured by network. |  | no | N/A | If UE does not support ATG specific P-max value, ATG UE can’t identify configured maximum output power PCMAX,f,c | 1. Per UE | No | FR1 only | N/A | Value range from  -21dBm to 42dBm | Mandatory without capability signaling |

Note

For antenna type features: these features have been approved in previous meeting and have sent the LS to RAN2.

For rated max output power: the feature has been approved in previous meeting and have sent the LS to RAN2. But no discussion of the feature type (9th column), please further check whether this capability is per band basis or not.

For ATG specific P-max, the feature have been approved in previous meeting and sent the LS to RAN2. but value range granularity has not been determined by RAN2.

* Recommended WF
  + Accept this proposal.

Agreement: Use one UE capability to indicate antenna types for ATG UE.

### Sub-topic 1-3 Draft CRs and TPs

|  |  |
| --- | --- |
| **CR number** | **Comments collection** |
| [**R4-2318917**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318917.zip) | Draft CR for TS 38.101-1 to update omni-directional and antenna array terminology (CMCC) |
|  |
|  |
| [**R4-2318922**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318922.zip) | Big CR for TS 38.101-1 for NR ATG (CMCC)  *Moderator’s note: this paper can be E-mail approved to capture more inputs.* |
|  |
|  |
| [**R4-2318638**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318638.zip) | CR on output power dynamics and Tx signal qulity for ATG UE (Apple) |
|  |
|  |
| [**R4-2319884**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319884.zip) | Draft CR for TS 38.101-1 to introduce ATG UE RF requirements part 1 (Huawei, HiSilicon) |
|  |
|  |
| [**R4-2320326**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320326.zip) | draft CR to TS 38.101-1: clause 6.5J,7.1J,7.2J (ZTE) |
|  |
|  |
| [**R4-2319797**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319797.zip) | Draft CR for TS 38.101-1 to introduce spurious response, intermodulation, and spurious emission for ATG UE for ATG UE (Ericsson) |
|  |
|  |
| [**R4-2320377**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320377.zip) | Draft CR for TS 38.101-1 to introduce ATG UE RF Rx requirements - part 1 (Qualcomm Incorporated) |
|  |
|  |

|  |  |
| --- | --- |
| **TP number** | **Comments collection** |
| [**R4-2318920**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2318920.zip) | TP for TR 38.876 to add conclusion part and update omni-directional terminology and other description (CMCC) |
|  |
|  |
| [**R4-2319881**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319881.zip) | TP for TR 38.876 to maintain the Tx RF requirements for ATG UE (Huawei, HiSilicon) |
|  |
|  |
| [**R4-2319798**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319798.zip) | TP to TR 38.876 on intermodulation characteristics (Ericsson) |
|  |
|  |
| [**R4-2319882**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2319882.zip) | TP for TR 38.876 to introduce some Rx requirements (Huawei, HiSilicon)  *Moderator’s note: Maximum input level can be merged into R4-2320376 and intermodulation characteristics can be merged into R4-2319798.* |
|  |
|  |
| [**R4-2320376**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_109/Docs/R4-2320376.zip) | TP to TR 38.876 on ATG UE Maximum input level (Qualcomm Incorporated) |
|  |
|  |