**3GPP TSG-RAN4 Meeting #112 R4-2414322**

**Maastricht, Netherlands, 19th – 23th Aug 2024**

**Agenda item:** 8.10.5

**Source:** CMCC

**Title:** WF on Rel-19 ATG UE RF requirements

**Document for:** Approval

# Introduction

This document captures the agreements on Rel-19 ATG UE RF requirements in RAN4#112.

# Topic #1: R18 UE RF requirements maintenance

## Tx requirements applicability

**Issue 1-1: Tx requirements applicability for ATG Tx requirements for two types of antenna**

Agreement:

* There is two types of antenna type for R18 ATG UE. For omni-direction antenna, the requirements should be measured at antenna connectors but for antenna array, the requirements should be measured at TAB connectors.
* Following requirements are defined as the sum of all antenna connectors/TAB connectors
  + 6.3J.1 Minimum output power for ATG
  + 6.3J.4 Power control for ATG
  + 6.5J.2 Out of band emission for ATG
  + 6.5J.3 Spurious emissions for ATG
* Following requirements are defined at each antenna connector/TAB connector
  + 6.3J.2 Transmit OFF power for ATG
  + 6.3J.3 Transmit ON/OFF time mask for ATG
* FFS the following requirements.
  + 6.5J.1 Occupied bandwidth for ATG
  + 6.4J.1 Frequency error for ATG
  + EVM requirements

# Topic #2: R19 UE RF for intra-band contiguous CA

**Issue 2-1-2: whether/how to reflect operation band information in spec**

Agreement:

* BCS 4 and 5 also needs to be specified besides BCS0.

**Table 1: BCS for CA\_n79C**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration / Bandwidth combination set** | | | | | | | | |
| **NR CA configuration** | **Uplink CA configurations or single uplink carrier5** | **Channel bandwidths for carrier (MHz)** | **Channel bandwidths for carrier (MHz)** | **Channel bandwidths for carrier (MHz)** | **Channel bandwidths for carrier (MHz)** | **Channel bandwidths for carrier (MHz)** | **Maximum aggregated  bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n79C | CA\_n79C | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | See n79 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |

**Issue 2-2: ACS testing parameters for case 2**

Agreement:

* Further check the following table.
* **Table 3: Test parameters for intra-band contiguous CA with FDL\_low ≥ 3300 MHz and FUL\_low ≥ 3300 MHz, case 2**

|  |  |  |
| --- | --- | --- |
| **Rx Parameter** | **Units** | **NR CA bandwidth class** |
|  |  | **C** |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | -73.54  -61.55 |
| PInterferer | dBm | -424  -305 |
| BWInterferer | MHz | BWchannel CA |
| FInterferer (offset) | MHz | BWchannel CA  /  -BWchannel CA |
| NOTE 1: The transmitter shall be set to 24 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4.  NOTE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.  NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.  NOTE 4: Pinterferer shall be set to -42dBm for omni-directional antenna.  NOTE 5: Pinterferer shall be set to -30dBm for antenna array. | | |

# Topic #3: R19 UE RF for inter-band CA

## antenna type assumption for inter-band DL CA\_n3-n39

**Issue 3-1-1:** **clarify the antenna type for DL CA\_n3-n39**

Agreement:

* Omni-antenna type can be assumed for both band n3 and n39.

**Issue 3-1-2: whether new capability is needed for ATG CA**

Agreement:

* no need for new capability for UE antenna type for ATG CA
* Antenna type per band could be applied to the same band in the band combination.

## RF implementation for inter-band CA\_n3A-n39A

**Issue 3-2-1: whether to allow n39 UL for CA\_n3A-n39A**

Agreement:

* Whether to allow n39 UL for CA\_n3A-n39A depend on companies’ input.
  + The filter with [X] MHz frequency gap can be considered.

**Issue 3-2-2: BCS for DL CA\_n3\_n39**

Agreement:

* **Table 1: BCS for CA\_n3A-n39A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n3A-n39A | - | n3 | 5, 10, 15, 20, 25, 30 | 0 |
|  |  | n39 | 5, 10, 15, 20, 25, 30, 35, 40 |  |

## Rx requirement for inter-band CA\_n3A-n39A

**Issue 3-4-1: delta RIB for NR CA\_n3A-n39A could be used as the baseline**

Agreement:

Table 3: ΔRIB,c

|  |  |  |
| --- | --- | --- |
| Inter-band CA combination | ΔRIB,c for NR bands (dB)\* | |
| Component band in order of bands in configuration\*\* | |
| CA\_n3-n39 | - | - |
| NOTE \*: “-” denotes ΔRIB,c = 0.  NOTE \*\*: The component band order in the configuration should be listed by the order of NR bands, such as for CA\_n1-n77 the band order from left to right is n1 and n77. | | |

**Issue 3-4-2: MSD for CA\_n3A-n39A**

Agreement:

* There is no MSD issue for n3 impact n39.

**Issue 3-4-3: OOB exception for CA\_n3A-n39A**

Agreement:

* No need to specify OOB blocking exception for CA\_n3-n39 since the second order intermodulation product of the n3 UL carrier and the CW interfering signal will not overlaps with the n39 DL carrier.

# Topic #4: R19 UE RF for UL-MIMO

**Issue 4-1-1: ULFPTx mode for UL-MIMO**

Agreement:

* FFS on whether to apply ULFPTx mode for ATG UE

**Issue 4-1-2: whether preclude the single antenna port related requirement**

Agreement:

* FFS on whether to preclude the single antenna port related requirement.

**Issue 4-2-1: how to modify the NR UL MIMO requirement with ATG capability antennaArrayType-r18**

Agreement:

* If the legacy requirement for UL MIMO is defined at each antenna connector,
  + For ATG UE with antenna array, the requirement should be updated [at each TAB connector].
* If the legacy requirement for UL MIMO is defined per layer, FFS
  + Option 1: for ATG UE with capability antennaArrayType-r18, the requirement should be updated as sum of all TAB connectors per layer.
  + Option 2: for ATG UE with capability antennaArrayType-r18, the requirement should be updated per layer without explicitly emphasize the TAB connector.

**Issue 4-2-2: whether to apply coherent UL MIMO requirement for ATG UE**

Agreement:

* FFS on whether to apply coherent UL MIMO requirement for ATG UE

**Issue 4-3: receiver requirements**

Agreement:

* Reuse ATG single carrier requirements for following Rx requirements (ZTE, Ericsson)
  + REFSENSE
  + Max input level
  + ACS
  + Blocking
  + Spurious emission
  + Intermodulation
* FFS whether to test the Rx requirements under the UL MIMO scenario since Rx requirements is the same for R18 ATG UE and R19 ATG UE supporting UL-MIMO.