**3GPP TSG-RAN WG4 Meeting #112 R4-2413535**

**Maastricht, Netherlands, August 19th – August 23rd, 2024**

**Agenda item:** 8.12.4

**Source:** vivo

**Title:** WF for [112][333] TRP\_TRS\_MIMO\_OTA

**Document for:** Approval

# Introduction

This is the WF for Rel-19 OTA WI.

# Topic #1: General

### Sub-topic 1-1 General for WI

**Issue 1-1-1: Reply LS to GCF CAG**

Agreements:

* + **Reply LS to GCF CAG in R4-2413537, is agreed.**

**Issue 1-1-2: Updated WP for Rel-19 OTA WI**

Agreements:

* + **Updated Workplan of Rel-19 OTA WI in R4-2412056 is agreed.**

# Topic #2: XR OTA

### Sub-topic 2-1 XR test scnarios and configurations

**Issue 2-1-1: Discussions on Reply LS from CTIA on XR OTA test phantom**

Agreements:

* + Two types of XR, i.e., glasses and head mounted display are prioritized in this WI.
  + Need to send this two XR types to CTIA for phantom positioning and MU study.

**Issue 2-1-4: Whether WI should focus on the XR devices those connected to gNB directly**

Agreements:

* + Only test XR devices with 5G link to gNB in networks, not those with side link or wired connections.

**Issue 2-1-6: Prioritize 1Tx XR devices?**

Agreements:

* + Prioritize 1Tx XR

**Issue 2-1-7: How to identify 2Rx XR devices?**

Agreements:

* + Consider at least the following approach to identify 2Rx XR device
    - Use UE capability supportOf2RxXR-r18 to identify XR devices with 2Rx.
      * FFS device can set IE correctly;
    - Based on UE declaration

**Issue 2-1-8: TRP TRS requirements for XR**

Agreements:

* + Performance metric for XR OTA can be discussed, but Requirements work discussion can be postponed until device and phantom are available.

### Sub-topic 2-2 Testing time reduction for XR OTA

**Issue 2-2-1: Coarse measurement grids**

Agreements:

The following Options can be further discussed next meeting:

**Option 1:** Stop the measurement in the middle and charge the battery, carefully re-place the XR device into the Chamber to continue the test.

**Option 2**: Test TRP at [X] dB below the maximum transmit power and scale up [X] dB to obtain TRP at maximum transmit power.

**Options 3**:

* Measure TRP: Averaging the measurement results from 4 of interpolated 62-points measurement grids by

to achieve the same accuracy level of using 266-points measurement grids during OTA tests.

(Define 4 of 62-points interpolated measurement grids based on 266-points measurement grids at the same time, the locations of each four of 62-points interpolated measurement grids is different from each other on the sphere, they can be considered orthogonal to each other.)

* Measure Peak EIPR: Full sphere coarse girds measurement + partial fine grids measurement

(For example, using 62-points measurement grids in OTA test to measure peak EIPR first, then based on the direction of peak EIPR, apply corresponding sectors (pre-defined 8 or 16 sectors) of 266-points measurement grids to measure the peak EIPR again to increase the accuracy of measured peak EIRP)

# Topic #3: NTN OTA

### Sub-topic 3-1 UE type and usage scenarios for NTN (NR-NTN and IoT-NTN)

**Issue 3-1-1: Usage scenarios for NR-NTN mobile handheld UE**

Agreements:

* + **Prioritize hand only**
  + **Other usage scenarios are not precluded**

[Apple] Considering the satellite operators’ comments, as an alternative to removing head+hand, may I suggest we change the bullet to the following:

“Consider hand only and head+hand, provided that RAN4 will discuss requirement applicability rules based on device type, NR-NTN/IoT-NTN support, or other criteria”

**Issue 3-1-4: UE type for IoT-NTN**

Agreements:

* + **For IoT-NTN test method development, RAN4 can consider handheld UE type as 1st priority.**

**Issue 3-1-5: Usage scenarios for IoT-NTN handheld UE**

Agreements:

* + **Same prioritized usage scenarios as NR-NTN handheld UE**

### Sub-topic 3-2 UE performance metric

**Issue 3-2-1: Whether full sphere or partial sphere (including half sphere) should be measured?**

Agreements:

* + **FFS measured sphere depending on performance metric**

[Apple] Agree with Samsung: RAN4 should first conclude the performance metric and later discuss the measurement procesure

### Sub-topic 3-3 NTN OTA test methodologies

**Issue 3-3-1: CBW for NR-NTN bands**

Agreements:

* + **Select 5MHz CBW for NR FR1 NTN OTA testing.**

**Issue 3-3-2: detailed test parameters for NR-NTN bands**

Agreements:

* + **Adopt the Table 1 and Table 2 test parameters for NR-NTN OTA testing.**
* Table 1: NR FR1 NR-NTN TRP measurement parameters

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | CBW [MHz] | SCS (kHz) | UL modulation | Range | UL Carrier centre  [ARFCN] | UL Carrier Center (MHz) | DL Carrier centre  [ARFCN] | DL Carrier Center (MHz) | UL RB Allocation  (LCRB @ RBstart) | DL configuration |
| n256 | 5 | 15 | DFT-s-OFDM  QPSK | Low | 396500 | 1982.5 | 434500 | 2172.5 | 12@6 | N/A |
| Mid | 399000 | 1995 | 437000 | 2185 |
| High | 401500 | 2007.5 | 439500 | 2197.5 |
| n255 | 5 | 15 | DFT-s-OFDM  QPSK | Low | 325800 | 1629 | 305500 | 1527.5 | 12@6 | N/A |
| Mid | 328700 | 1643.5 | 308400 | 1542 |
| High | 331600 | 1658 | 311300 | 1556.5 |

* Table 2: NR FR1 NR-NTN TRS measurement parameters

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | CBW (MHz) | SCS (kHz) | DL modulation | UL modulation | Range | UL Carrier centre  [ARFCN] | UL Carrier Center (MHz) | DL Carrier centre  [ARFCN] | DL Carrier Center (MHz) | UL RB Allocation  (LCRB @ RBstart) | DL Configuration (FULL RB, LCRB @ RBstart) |
| n256 | 5 | 15 | CP-OFDM QPSK | DFT-s-OFDM  QPSK | Low | 396500 | 1982.5 | 434500 | 2172.5 | 25@0 | 25@0 |
| Mid | 399000 | 1995 | 437000 | 2185 |
| High | 401500 | 2007.5 | 439500 | 2197.5 |
| n255 | 5 | 15 | CP-OFDM QPSK | DFT-s-OFDM  QPSK | Low | 325800 | 1629 | 305500 | 1527.5 | 25@0 | 25@0 |
| Mid | 328700 | 1643.5 | 308400 | 1542 |
| High | 331600 | 1658 | 311300 | 1556.5 |

**Issue 3-3-3: test parameters for IoT-NTN**

Agreements:

* + **RAN4 should further discuss test parameters for IoT-NTN OTA.**

**Issue 3-3-4: How to resolve UE antenna circular polarization issue**

Agreements:

* + **FFS RAN4 how to accommodate different UE polarization implementations, i.e., either circular polarization or cross polarization.**

# Topic #4: FR1 dynamic MIMO OTA

### Sub-topic 4-1 Dynamic channel model generation and validation

**Issue 4-1-1: TR skeleton**

Agreements:

* + **Approve the TR skeleton in R4-2411573.**

**Issue 4-1-3: On adopting Umi and Uma channel models**

**Agreements:**

* + **3GPP RAN4 to initially adopt the work done by CTIA on MIMO Multi-Probe Anechoic Chamber (MPAC) dynamic Channel Model as starting point.**
  + **The starting point should include both UMa and UMi. Post processing of results from different routes is FFS.**
  + **RAN4 developing additional channel models is not precluded.**

### Sub-topic 4-2 Test system for FR1 dynamic MIMO OTA

**Issue 4-2-1: Link adaption configuration for Dynamic FR1 MIMO OTA**

Agreements:

* + **o Adopt the mapping table between CQI and MCS used for demodulation in Table A.4-2 and Table A.4-3 in the annex of TS 38.101-4 for dynamic MCS adaption.**

**Issue 4-2-3: Test parameters for FR1 dynamic MIMO OTA**

Agreements:

* + **Set the maximum number of HARQ transmissions to [x] for FR1 dynamic MIMO OTA** **with x>1.**

### Sub-topic 4-3 UE Performance metric

**Issue 4-3-1: UE measurement results collection**

Agreements:

* + **Collect measurement throughput data from different UEs during the measurement campaign to study FoM.**
  + **Benchmarking Throughput vs. Noise-limited and Throughput vs. Interference-limited environmental conditions is not precluded.**
  + **Presentation of channel model validation is encouraged.**

**Issue 4-3-2: TR work splitting**

Agreements:

**Consider the following work splitting to draft TR 38.762.**

|  |  |
| --- | --- |
| *Clause in TR 38.762* | *TP owners* |
| *Draft TR structure, editorial correction, general information of each Clause, etc* | *CAICT, MVG* |
| *3. Definitions of terms, symbols and abbreviations* | *CAICT* |
| *4. General* | *CAICT, Apple, MVG* |
| *5. Performance metrics* | *Keysight, Spirent, Apple, Qualcomm, Samsung, OPPO, CAICT* |
| *6. Measurement methodology* | *Keysight, Spirent, Apple, Qualcomm, Xiaomi* |
| *7. Channel models* | *Keysight, Spirent, Apple* |
| *8. Channel model validation* | *Keysight, Spirent, Apple, Xiaomi* |
| *9. gNodeB configurations* | *Keysight, Spirent, Samsung* |
| *Annex A: Channel model parameters* | *Keysight, Spirent, Apple* |
| *Annex B: UE coordinate system* | *Keysight, Spirent, Apple, OPPO* |
| *Annex C: Measurement uncertainty* | *Keysight, Apple, MVG, ETS-Lindgren* |
| *Annex D: Environmental requirements* | *Keysight, Spirent, Apple, OPPO* |

# Topic #5: Rel-19 FR1 OTA requirements

### Sub-topic 5-1 FR1 TRP TRS requirements

**Issue 5-1-1: 1Tx requirements for TRP TRS**

Agreements:

* + **No need to perform further lab alignment testing in Rel-19.**

**Issue 5-1-2: 2Tx requirements for TRP TRS**

Agreements:

* + **AC lab alignment for non-coherent UL MIMO at n41/n78 should be done in Rel-19, the framework can be similar to Rel-18, encourage test labs to join this activity.**

[Apple] Would it be possible for the Rapporteur to provide a timeline by which test labs should declare their intention to participate?

**Issue 5-1-3: Size 2 TRP TRS requirements (PDA hand)**

Agreements:

* + **RAN4 further discuss how to specify size 2 UE TRP TRS requirements.**

### Sub-topic 5-2 FR1 MIMO OTA requirements

**Issue 5-2-1: Further FR1 MIMO OTA lab alignment activity**

Agreements:

* + **No need to perform static MPAC lab alignment activities in Rel-19.**