**3GPP TSG-RAN WG4 Meeting #101-e R4-2120684**

**Electronic Meeting, 1 – 12 November, 2021**

**Agenda item:** 8.1.1

**Source:** vivo, CAICT

**Title:** WF on NR MIMO OTA

**Document for:** Approval

# Introduction

This is the Way Forward on NR MIMO OTA.

# Way Forward on Topic #1: General and Testing

### Sub-topic 1-1 Channel model validation for FR1

**Issue 1-1-1: Beam specific reference curves for FR1 CDL-C UMa channel model validation**

*Agreements:*

o Approve the beam specific CDL-C UMa PDP and TCF curves in R4-2119379 as reference channel curves for FR1 channel model validation, and omit the combined beam curves for PDP and TCF in R4-2115759.

**Issue 1-1-2: Approaches for FR1 CDL-C UMa channel model validation**

*Agreements:*

o Adopt the beam specific approach for PDP, TCF, and V/H Ratio, and adopt the beam simultaneous approach for SCF.

**Issue 1-1-3: Inconsistence between PDP reference and measurement setting**

*Agreements:*

The reference PDP should be filtered to the BW of 200 MHz to compare the measurement results with the reference for FR1channel model validation.

The reference PDP filtered to the BW of 200 MHz should be stabilized in Jan. RAN4 meeting. A check point for offline alignment among CE venders before Jan. 2022 is encouraged. It is also encouraged to share the results in the NR MIMO OTA email reflector before Jan. 2022.

FFS how to define the pass/fail limits based on 200MHz-filtered reference.

**Issue 1-1-4: PDP pass/fail limits for FR1 CDL-C UMa channel model validation**

GTW Agreement: Companies are encouraged to continue offline discussion before Jan. 2022 RAN4 meeting to collect the measurement results from labs in the NR MIMO OTA email reflector, and final agreement need to be confirmed and decided by Jan 2022 RAN4#101bis-e meeting.

**Issue 1-1-5: Temporal Correlation pass/fail limits for FR1 CDL-C UMa channel model validation**

* Proposals
  + Option 1: R4-2118587

0.25λ, [+/- 0.05, capped at 1]

0.5λ, [ +/- 0.05]

1 λ, [ +/- 0.075]

1.5λ, [ +/- 0.1]

2λ, [ +/- 0.1]

2.5λ and greater, [ +/- 0.2]

* + Option 2: Pass/Fail limits are formed as bands of [±10%] of correlation capped at 100% from the target. Additionally, when the upper bound reaches [30%], the limit stays at [30%] and the lower limit drops to 0%. (R4-2119093)
  + Others

GTW Agreement: Option 2 as starting point, meanwhile companies are encouraged to continue offline discussion together with other parameters and final conclusion will be made in Jan 2022 RAN4 meeting.

**Issue 1-1-6: Spatial Correlation pass/fail limits for FR1 CDL-C UMa channel model validation**

* Proposals
  + Option 1: Adopt the Spatial Correlation pass/fail limits presented in R4-2118587.
  + Option 2: Pass/Fail limits are formed as bands of [±10%] of correlation capped at 100% for the upper limit for target correlation of 35% and above. For target correlations below 35%, the band is widened to [±20%] capped at 0%. (R4-2119093)
  + Others

GTW Agreement: Option 2 as starting point, meanwhile companies are encouraged to continue offline discussion together with other parameters and final conclusion will be made in Jan 2022 RAN4 meeting.

**Issue 1-1-7: V/H ratio pass/fail limits for FR1 CDL-C UMa channel model validation**

GTW agreements: Companies are encouraged to continue offline discussion before Jan .2022 RAN4 meeting to collect the measurement results from labs in the NR MIMO OTA email reflector, and final agreement need to be confirmed and decided by Jan 2022 RAN4#101bis-e meeting.

### Sub-topic 1-2 FR2 channel model validation

**Issue 1-2-1: Clarification on “frequent re-positioning” for FR2 PSP**

*Agreements:*

FFS clarify “frequent re-positioning” for FR2 PSP is needed or not

**Issue 1-2-2: Clarification of NF Compensation for FR2 PSP**

*Agreements:*

o Approve the TP in R4-2119377 for inclusion in TS 38.151 V0.5.0.

### Sub-topic 1-3 FR2 MIMO OTA test points clarification

**Issue 1-3: FR2 MIMO OTA test points clarification**

*Agreements:*

o Provide illustrations of device/positioner/probe configurations & orientations based on the sample system for various test points in a TP in the next meeting.

# Way Forward on Topic #2: Performance requirements

### Sub-topic 2-1 Time plan for FR1 lab alignment and requirement development

**Issue 2-1-1: Time plan for FR1 lab alignment and requirement development**

*Agreement:*

The updated time plan for FR1 lab alignment activity is approved in R4- 2120683.

**Issue 2-1-2: Participation of FR1 lab alignment activity**

*Agreement:*

Additional test lab alignment is not precluded, after the finalization of 1st round 7-labs activity. Progress on defining requirement work should not be impacted.

### Sub-topic 2-2 Performance alignment devices (PADs) for FR1 lab alignment

**Issue 2-2-1: PAD selection**

*Agreements:*

All the 4 PAD candidates are remained as PADs. Three devices for each band as following:

|  |  |
| --- | --- |
| **Test band** | **PAD candidate** |
| n41 | 1. PAD candidate\_SAMSUNG  2. PAD candidate\_Xiaomi  3. PAD candidate\_OPPO |
| n78 | 1. PAD candidate\_SAMSUNG  2. PAD candidate\_Xiaomi  3. PAD candidate\_vivo |

To be noted: the PADs corresponding to each band will be marked as PAD\_1, PAD\_2, PAD\_3 during lab alignment activity, the corresponding results should not state the brand directly i.e. anonymous approach.

**Issue 2-2-2: PAD management and roaming scheme**

*Agreements:*

Consider transfer PADs initially among labs located in Beijing and Shanghai, then New Taipei City, the final PADs destination is the Cupertino located lab.

Encourage labs measure and deliver PADs efficiently

FFS additional back-up PADs will be added into PAD pool

### Sub-topic 2-3 FR1 lab alignment activity

**Issue 2-3-1: How to process the lab alignment results**

GTW Agreement:

* To guarantee a timely progress of the WI, the average of the PAD measurement results submitted on or before April.30 2022 will be treated as the reference value of the PAD based on the condition at least 3 labs’ results collected
  + All labs shall have the opportunity to get PADs for test in time
* The framework for PAD alignment and pass/fail criteria need to be decided by Jan 2022 RAN4 meeting.

**Issue 2-3-2: Which value shall be used for alignment comparison**

*Agreement:*

TRMS value is used for alignment comparison.

**Issue 2-3-3: Pass/fail limit for lab alignment**

*Agreement:*

RAN4 should define the pass/fail limit for lab alignment, based on MU value of MPAC system.

### FR1 MIMO OTA test campaign

**Issue 2-4-1: Commercial devices preparation**

*Agreement:*

Early discussion on commercial device preparation and handling is needed to fulfil the WI performance part objectives.

**Issue 2-4-2: Commercial devices test**

*Agreement:*

It is not necessary to perform conduction test for the devices in test campaign.

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

**Issue 2-5: How to handle non-linear TP behaviour**

Agreements

* The procedure on how to treat non-liner TP behaviour for NR MIMO OTA testing should be captured in the test procedure part.
* The selected PADs should not present non-liner TP behaviour

### Sub-topic 2-6 FR2 MIMO OTA performance requirements

**Issue 2-6-1: Maximum downlink power for FR2 MIMO**

*Agreement:*

For the maximum DL power definition, leverage the same 8dB cable loss assumption as in TR38.810.

Use the RAN5 assumption of -17.7dB backoff for faded signals.

Define the maximum DL power in the centre of the QZ for the NR FR2 MIMO OTA system to be [-79.1dBm/120kHz] with the assumption that all 6 probes are used, as starting point.

**Issue 2-6-3: FR2 Simulation**

*Agreement:*

RAN4 to start to collect the simulation results for 36 test directions in RAN4#101-bis-e meeting.

o Channel model parameters from TR38827 should be used

o Polarization mismatch should be considered

o RAN4 to conduct email discussion to collect the simulation results before RAN4#101-bis-e meeting

TE/CE vendors to encouraged to share the variation range for AoA/ZoA, PAS, power, delay, etc., those impacted by 6 probes for FR2 simulation in RAN4#101-bis-e.

### Sub-topic 2-8 Preliminary MIMO OTA MU assessment

**Issue 2-8-2: Baseline/reference for FR1 MU assessment**

*Agreement:*

LTE expanded MU value cannot be reused directly. The preliminary MU assessment for FR1 should be finalized next meeting to ensure the whole lab alignment progress.

# Reference

*[1] R4-2120726, Email discussion summary for [101-e][325] NR\_MIMO\_OTA, Moderator (CAICT), RAN4#101e, Nov 2021.*