**3GPP TSG-RAN WG4 Meeting #111 R4-2409927**

**Fukuoka, Japan, 20th – 24th May, 2024**

**Title:** Way Forward for [111][337] NR\_MIMO\_OTA\_enh

**Agenda Item:** 7.10.4

**Source:** CAICT

**Document for:** Approval

# Topic #1: General

### Sub-topic 1-1 General views and LS on Rel-18 MIMO OTA performance work

**Issue 1-1-1: Proposals on concluding Rel-18 MIMO OTA performance work**

**Agreement:**

* RAN4 has concluded the Perf. part of Rel-18 MIMO OTA WI, finalizing the FR1 MIMO OTA performance requirement for bands n1, n5, n28, as well as the FR2 MIMO OTA performance requirement for band n261.

**Issue 1-1-2: LS on Rel-18 MIMO OTA progress**

**Agreement:**

* With concluding the MIMO OTA performance requirements, send an LS to other OTA groups on 3GPP RAN4 Rel-18 MIMO OTA progress, to ensure industry coordination on this topic.
* The LS is approved in R4-2408908.

# Topic #2: FR1 MIMO OTA

### Sub-topic 2-1 Additional criteria for bands <1GHz

**Issue 2-1-1: General views on additional criteria and UE pool**

**Agreement:**

* RAN4 should carefully check the UE samples and exclude any abnormal measurement results, to avoid any misleading decisions on the test method/addition criteria.

**Issue 2-1-2: Additional criteria for bands <1GHz**

**Agreement:**

* For bands <1GHz, PRS-EPRE-MAX is increased to -78dBm/15kHz for FR1 MIMO OTA, and the additional criteria at 90%TP is relaxed to 8 out of 12 orientation.
* The corresponding CR to TS 38.151 is agreed in R4-2409923.

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

**Issue 2-2-1: Measurement data submission deadline for the data pool**

**Agreement:**

* The data pool for Rel-18 FR1 MIMO OTA requirements was frozen before the start of RAN4 #111.

**Issue 2-2-2: Scope of the performance data pool for bands <1GHz**

**Agreement:**

* Include all measurements irrespective of whether they failed the original additional criteria for bands <1GHz.

**Issue 2-2-3: FR1 MIMO OTA performance requirements (n1/n5/n28)**

**Agreement:**

* Based on the CDF analysis of the data pool in R4-2407661 and the agreement of Issue 2-2-2, RAN4 concludes the FR1 MIMO OTA performance requirements as below:
	+ For band n28, specify the TRMSaverage,70 minimum requirement as -84.6 dBm/15kHz
	+ For band n5, specify the TRMSaverage,70 minimum requirement as -88.0 dBm/15kHz
	+ For band n1, specify the TRMSaverage,70 minimum requirement as -96.0 dBm/15kHz
* Note:
	+ Due to the relatively late decision to specifying 4x4 MIMO OTA requirement instead of 2x2 MIMO OTA for band n1 in Rel-18, only one lab finally submitted the measurement data, which possibly limited the diversity and range of the n1 data pool (though meeting the minimum criteria). Given these aspects, and further considering the LTE B1 TRMS requirement, the NR n1 TRMS requirement is agreed as -96.0 dBm/15kHz.
	+ Note that this n1 TRMS requirement is beyond the range of the data pool, and the decision is based on specific considerations of the current n1 data pool. It should not be used as a reference procedure for future performance requirements definition for other bands. A further revisit is not precluded when the limitations on Rel-18 n1 data pool are addressed.
* The corresponding CR to TS 38.151 is agreed in R4-2409923.

# Topic #3: FR2 MIMO OTA

### Sub-topic 3-1 Additional criteria for FR2 MIMO OTA

**Issue 3-1: Additional criteria for FR2 MIMO OTA**

**Agreement:**

* Not to define the additional criteria on 90%TP for FR2 MIMO OTA in Rel-18.

### Sub-topic 3-2 FR2 MIMO OTA lab alignment activity

**Issue 3-2: FR2 MIMO OTA lab alignment outcome**

**Agreement:**

* Based on the summary and analysis in R4-2407663, RAN4 concludes the FR2 MIMO OTA lab alignment activity with the following outcome:
	+ 4 labs (Apple, CAICT, CMCC, Huawei) are aligned at 28-GHz band.

### Sub-topic 3-3 FR2 MIMO OTA performance requirements

**Issue 3-3-1: Updated Framework for FR2 MIMO OTA performance requirements**

**Agreement:**

* The updated Framework for FR2 MIMO OTA performance requirements is approved in R4-2407662.

**Issue 3-3-2: Data pool for performance requirement**

**Agreement:**

* The data pool for Rel-18 FR2 MIMO OTA requirements was frozen before the start of RAN4 #111.

**Issue 3-3-4: FR2 MIMO OTA performance requirement (n261)**

**Agreement:**

* Based on the CDF analysis of the data pool in R4-2409926, RAN4 concludes the FR2 MIMO OTA performance requirements as below:
	+ For band n261, specify the MASC70 minimum requirement as -100.0 dBm/120kHz.
* The corresponding CR to TS 38.151 is agreed in R4-2409923.

# References

1. R4-2410127, “Topic summary for [111][337] NR\_MIMO\_OTA\_enh”, Moderator (CAICT), 3GPP TSG-RAN WG4 Meeting #111, May 2024.
2. R4-2409854, “Ad-hoc meeting minutes for [111][337] NR\_MIMO\_OTA\_enh”, Moderator (CAICT), 3GPP TSG-RAN WG4 Meeting #111, Apr. 2024.

# Annex A: UE information statistics of FR1 device pool by RAN4 MCC (for information)

|  |  |  |  |
| --- | --- | --- | --- |
| **Total Devices** | **31** |  |  |
| **Total Models** | **30** |  |  |
| **Total number of device vendors** | **10** |  |  |
| **Percentage of devices per vendor** | **1** | **3.23%** | **Vendor A** |
| **2** | **6.45%** | **Vendor B**  |
| **1** | **3.23%** | **Vendor C** |
| **1** | **3.23%** | **Vendor D** |
| **4** | **12.90%** | **Vendor E** |
| **4** | **12.90%** | **Vendor F** |
| **1** | **3.23%** | **Vendor G** |
| **8** | **25.81%** | **Vendor H** |
| **2** | **6.45%** | **Vendor I** |
| **7** | **22.58%** | **Vendor J** |
| **Percentage of devices per power class** | **NA** | **NA** | **PC2** (No PC2 test case for Rel-18 MIMO OTA measurement campaign) |
| **31** | **100%** | **PC3** |
| **Percentage of devices per supported band** | **31** | **100%** | **n1** |
| **30** | **96.77%** | **n28** |
| **31** | **100%** | **n41** |
| **31** | **100%** | **n78** |
| **Percentage of devices per year of production** | **1** | **3.23%** | **2020** (excluded from the data pool) |
| **6** | **19.35%** | **2021** |
| **13** | **41.94%** | **2022** |
| **8** | **25.81%** | **2023** |
| **3** | **9.68%** | **2024** |
| **Percentage of devices with at least one certification** | **31** | **100%** |  |
| **Percentage of devices for each certification** | **2** | **6.45%** | **GCF** |
| **2** | **6.45%** | **PTCRB** |
| **27** | **87.10%** | **NAL(CTA)** |
| **0** | **0.00%** | **FCC** |
| **0** | **0.00%** | **CE** |
| **1** | **3.23%** | **Not Available** |