**3GPP TSG RAN meeting #97-e RP-222634**

**Electronic Meeting, September 12-16, 2022**

## Status Report to TSG

**Agenda item:** 9.5.4.1

|  |  |
| --- | --- |
| **WI / SI Name** |  |
| included in this status report | Study Item: No | Core part: Yes | Performance part:Yes | Testing part:No |
| **Acronym** | NR\_MIMO\_OTA |
| **Unique ID** | 880078 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | [RP-222348](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_97e/Docs/RP-222348.zip) |
| **Target Completion Date****(indicate if changed)** | Study Item:  | Core part: Jun/2022 | Performance part: Sep/2022 | Testing part:  |
| **Overall Completion level** | Study Item:  | Core part: 100% | Performance Part: 100% | Testing part:  |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | TSG RAN WG4 |
| **Rapporteur** | **Name** | Zhu, Siting; Xing, Jinqiang |
| **Company** | CAICT, OPPO |
| **Email** | zhusiting@caict.ac.cn xingjinqiang@oppo.com  |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.4 RAN4

#### 2.4.1 Agreements

**RAN4 #104-e (Aug. 2022, Electronic Meeting)**

* **General**
* The email discussion has been summarized in [1].
* WF on NR MIMO OTA was approved. [2]
* LS on NR MIMO OTA was approved. [3]
* Draft CR to update Number of HARQ Processes to TS 38.151 and TR 38.827 was endorsed. [4, 5]
* Draft CR to TS 38.151 on editorial correction was endorsed. [6]
* draft CR to TS38.151 on maximum downlink power and additional criterion for FR1 MIMO OTA test was endorsed. [7]
* draft CR to TS38.151 on MIMO OTA requirements was merged. [8]
* draft CR to TS38.151 on minimum requirements was endorsed. [9]
* draft CR to 38.151 on Validation Passfail limit was endorsed. [10]
* draft CR to 38.151 on Channel model validation was endorsed. [11]
* Outcome of 3GPP FR1 MIMO OTA lab alignment activity was discussed and concluded [17]
* Analysis of 3GPP FR1 MIMO OTA Performance Test Campaign and Proposals for requirements was discussed and concluded [28]
* **Agreements on General and testing methodology maintenance**
* Issue 1-1: LS on NR MIMO OTA progress
* Send an LS on NR MIMO OTA progress to RAN5, CTIA MOSG and CCSA TC9 WG1.
* The LS in R4-2215136 is approved.
* Issue 1-3-1: PDP pass/fail limits for FR2 channel model validation
* Remove the square brackets in Table D.4.2-1, i.e., the PDP pass/fail limits for FR2 CDL-C UMi channel model validation are specified as below.

Table D.4.2-1: PDP pass/fail limits for FR2 CDL-C UMi channel model validation

|  |  |  |
| --- | --- | --- |
|  | Power Tolerance | Delay Tolerance |
| Paths from 0dB to 10dB | ±1dB | ±6ns |
| Paths from 10dB to 30dB | ±5dB | ±6ns |
| Paths from 30dB to 40dB | ±10dB | ±6ns |

* Issue 1-3-2: Wording of the Temporal Correlation pass/fail limits for FR2
* Adopt the following wording of the Temporal Correlation pass/fail limits for FR1:
	+ - The pass/fail limits for theoretical temporal correlation defined in Clause C.3.3 above 0.3 are formed as bands of ±0.1 of correlation capped at 1 at the high end. Additionally, when the theoretical temporal correlation drops below 0.3, the limits are formed at bands of ±0.3 of correlation capped at 0 at the low end.
* Adopt the following wording of the Temporal Correlation pass/fail limits for FR2:
	+ - The pass/fail limits for theoretical temporal correlation defined in Clause D.3.3 above 0.3 are formed as bands of ±0.1 of correlation capped at 1 at the high end. Additionally, when the theoretical temporal correlation drops below 0.3, the limits are formed at bands of ±0.3 of correlation capped at 0 at the low end.
* Issue 1-3-3: Tighten the Temporal Correlation pass/fail limits for FR2
* Keep the temporal correlation pass/fail limits the same for FR1 and FR2, i.e., not to tighten the temporal correlation pass/fail limits for FR2.
* It is not excluded to further tighten this value (if necessary) when more validation results are obtained.
* Issue 1-3-4: Cross-polarization (V/H) pass/fail limits for FR2 channel model validation
* Remove the square brackets, i.e., the cross-polarization ratio pass/fail limit is specified as ±1.5 dB.
* Issue 1-3-5: PSP pass/fail limits for FR2 channel model validation
* Remove the square brackets, i.e., the PSP pass/fail limit is specified as 84%.
* **Agreements on FR1 Performance requirements**
* Issue 2-1-1: Maximum downlink power and additional criterion for FR1 MIMO OTA
* Remove the square brackets and confirm the maximum downlink RS-EPRE as -80dBm/15kHz (or equivalent -77dBm/30kHz) for FR1 MIMO OTA.
* Proposal 2: Remove the square brackets in additional criterion. The EUT must meet 90% throughput in 10 of total 12 azimuthal orientations.
* Define the same criterion on 90%TP for bands ≥3GHz and bands <3GHz.
* Issue 2-2-1: Pass/fail limit for FR1 MIMO OTA lab alignment
* Keep the current FR1 lab alignment pass/fail limit unchanged as +/- 0.75MU, i.e., +/- 2.25 dB for band <3GHz and +/- 2.55 dB for band >3GHz.
* Issue 2-2-2: FR1 MIMO OTA lab alignment outcome
* 3GPP FR1 MIMO OTA lab alignment among the 6 labs, i.e., CAICT, CMCC&BUPT, Huawei, MediaTek, Xiaomi, and Apple is confirmed.
* 3GPP FR1 MIMO OTA lab alignment activity is closed in RAN4#104-e meeting.
* Issue 2-3: TRMS measurement data for defining FR1 MIMO OTA performance requirements
* The TRMS measurement results in R4-2209330 (CAICT), R4-2209513 (Xiaomi), R4-2208413 (CMCC&BUPT), R4-2213204 (Xiaomi), R4-2211996 (Huawei), and R4-2212407 (Apple) are included in FR1 MIMO OTA data pool for defining performance requirements.
* Issue 2-4-2: Final values of TRMS requirements
* Define FR1 MIMO OTA TRMS minimum performance requirements as below:
	+ - n41: -93.3 dBm/30kHz
		- n78: -94.8 dBm/30kHz
* Issue 2-5-1: Test Tolerance (TT) and MU assessment work in RAN4 and RAN5
* RAN4 should discuss recommended TT values for FR1 MIMO OTA, and provide the recommended TT values to RAN5.
* The final MU and TT will be decided by RAN5, but it is suggested not to change the TT values for FR1 MIMO OTA TRMS in RAN5.
* Issue 2-5-2: TT values for FR1 MIMO OTA
* Define recommended TT values for FR1 MIMO OTA as 0.6MU, i.e., 1.8dB for n41 and 2dB for n78.
* **Agreements on FR2 Performance requirements**
* Issue 3-1: General views on FR2 MIMO OTA requirements development
* No agreements in RAN4 on FR2 MIMO OTA requirements. How to conclude the performance part of FR2 MIMO OTA depending on the RAN-P decision.

#### 2.4.2 Remaining Open issues

None.

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

N/A

## 4. References

**RAN4#104-e**

1. R4-2214320 Email discussion summary for [104-e] [331] NR\_MIMO\_OTA Moderator (CAICT)
2. R4-2214360 WF on NR MIMO OTA CAICT, vivo
3. R4-2215136 LS on NR MIMO OTA CAICT
4. R4-2211826 Draft CR to update Number of HARQ Processes Keysight Technologies UK Ltd, vivo, Samsung, CAICT
5. R4-2211827 Draft CR to update Number of HARQ Processes Keysight Technologies UK Ltd, vivo, Samsung, CAICT
6. R4-2211987 Draft CR to TS 38.151 on editorial correction Samsung
7. R4-2212644 draft CR to TS38.151 on maximum downlink power and additional criterion for FR1 MIMO OTA test CAICT
8. R4-2212828 draft CR to TS38.151 on MIMO OTA requirements vivo
9. R4-2214794 draft CR to TS38.151 on minmum requirements CAICT
10. R4-2214816 CR to 38.151 on Validation Passfail limit Huawei,HiSilicon
11. R4-2214818 CR to 38.151 on Channel model calidation Huawei,HiSilicon
12. R4-2211560 On MIMO OTA FR1 lab alignment criteria Huawei Tech.(UK) Co.. Ltd
13. R4-2211996 FR1 MIMO OTA Test Campaign results from Huawei Huawei Tech.(UK) Co.. Ltd
14. R4-2212323 Channel model validation results for FR2 CMCC
15. R4-2212407 MIMO OTA device measurement results and requirement proposal Apple
16. R4-2212639 Proposals on concluding NR MIMO OTA WI CAICT,SAICT
17. R4-2212642 Summary of FR1 MIMO OTA lab alignment results CAICT
18. R4-2212819 Views on Test Tolerance for FR1 MIMO OTA vivo
19. R4-2213177 On FR2 MIMO OTA requirements Qualcomm Incorporated
20. R4-2213187 Discussion on FR2 MIMO OTA performance requirements Huawei,HiSilicon
21. R4-2213197 on the performance requirement for FR1 MIMO OTA Xiaomi
22. R4-2213204 test result for FR1 performance requirement Xiaomi
23. R4-2213422 Lab alignment and requirement for FR1 MIMO OTA OPPO
24. R4-2213427 Views on FR1 MIMO OTA performance requirement OPPO
25. R4-2213428 Views on FR2 MIMO OTA performance requirement OPPO
26. R4-2214817 Discussion on FR2 MIMO OTA channel model validation Huawei,HiSilicon
27. R4-2215135 MIMO OTA lab alignment results Apple
28. R4-2215137 Proposals on FR1 MIMO OTA performance requirements CAICT

 01.08.2022 minor adaptations for RAN #97e

 21.05.2022 minor adaptations for RAN #96

 10.01.2022 minor adaptations for RAN #95e

 04.10.2021 minor adaptations for RAN #94e

 08.08.2021 minor adaptations for RAN #93e

 17.05.2021 minor adaptations for RAN #92e

 28.01.2021 minor adaptations for RAN #91e

 09.11.2020 minor adaptations for RAN #90e

 31.08.2020 minor adaptations for RAN #89e

 20.04.2020 minor adaptations for RAN #88e

 18.02.2020 minor adaptations for RAN #87e

 14.11.2019 minor adaptations for RAN #86

 18.08.2019 minor adaptations for RAN #85

 12.05.2019 minor adaptations for RAN #84

 27.02.2019 minor adaptations for RAN #83

 21.11.2018 completion levels with colours added (for RAN #82)

v04.81 31.07.2018 simplification of template and addition of cross-TSG aspects (for RAN #81)

v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

v04.75 31.01.2017 minor adaptations for RAN #75

v04.74 28.10.2016 minor adaptations for RAN #74

v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

v04.70 30.10.2015 minor adaptations for RAN #70

v04.69 12.08.2015 minor adaptations for RAN #69

v04.68 21.05.2015 minor adaptations for RAN #68

v04.67 01.02.2015 minor adaptations for RAN #67

v04.66 16.11.2014 minor adaptations for RAN #66

v04.65 16.08.2014 minor adaptations for RAN #65

v04.64 22.05.2014 minor adaptations for RAN #64

v04.63 24.01.2014 restructuring for RAN #63 to cover Core & Perf. in one doc file

v03.62 11.11.2013 section 1.2.3 adapted for RAN #62

v03 11.08.2013 section 1.2.3 added on time budget

v02 07.05.2010 history added, some spelling corrections

v01 13.11.2009 First version of the template