**0.4.0**

**Variant of [98e-28-R18-MIMO-OTA] Version 0.0.3**

**RAN**

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**3GPP TSG RAN Meeting #98-e RP-223468**

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

**Agenda item: 9.3.4.12**

**Source:** RAN4 Vice-Chair (Samsung)

**Title:** Moderator's summary for discussion [97e-27-R17-MIMO-OTA]

**Document for:** Discussion & Decision

# 1 Introduction

This document provides as summary of the following email discussion during RAN#98-e:

- Goal: Seek for the conclusion on proposed update on Rel-18 MIMO OTA WID

**Table 1:**

| Email Thread Title | Related Documents | Moderator | Agenda |
|---|---|---|---|
| [98e-28-R18-MIMO-OTA] | RP-223081, 3110, 3156, 3184, 3186 | Haijie Qiu, RAN4 VC | 9.3.4.12 |

# 2 Topic #1: Rel-18 MIMO OTA WI Update

**List of contributions**

**Table 2:**

| T-doc | Title | Source | Proposals |
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| RP□223081 | Discussion on MIMO OTA | Xiaomi | **Observation 1: Current FR2 MIMO OTA framework has well considered both the measurement and simulation method.**<br>**Observation 2: The PAD collection as well as simulation volunteer collection has already achieved some progress.**<br>**Proposal 1: To agree on the feasibility of hybrid simulation and measurement approach.** |
| RP□223110 | Discussions on Rel-18 MIMO OTA enhancement | vivo | **Observation 1: The feasibility of pure measurement approach to define FR2 MIMO OTA requirement is not confirmed.**<br>**Observation 2: The feasibility of hybrid approach to define FR2 MIMO OTA requirement is not confirmed.**<br>**Proposal 1: Update the WID to further check FR2 framework feasibility, and down-selection of the approaches is needed.**<br>**Proposal 2: Update the WID with removing the scope of introducing more FR1 channel models.** |

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| RP□223156 | Views on FR2 MIMO OTA requirements development | Qualcomm Incorporated | **Observation 1: As agreed in RAN4, both Pure measurement approach and Hybrid simulation and measurement approach can be considered to specify the FR2 MIMO OTA requirements.**<br>**Observation 2: How to select between Pure measurement and Hybrid simulation and measurement approaches depends on whether the number of measured devices is sufficient.**<br>**Proposal 1: To include both Pure measurement approach and Hybrid simulation and measurement approach in Rel-18 MIMO OTA WID to align the RAN4 agreements on the framework of FR2 MIMO OTA requirements development.**<br>**Proposal 2: The simulation efforts and measurement efforts can be conducted in parallel before RAN4 makes the decision on selecting either Pure measurement approach or Hybrid simulation and measurements approach.** |

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| RP□223186 (Revised WID RP-223184) | Discussion on R18 NR MIMO OTA enhancement | CAICT | **Observation 1: RAN4 has made good progress on the framework for FR2 MIMO OTA requirement development. A workable framework is agreed, both Pure measurement approach and Hybrid of simulation and measurement approach will be considered.**<br>**Observation 2: Detailed working procedures of lab alignment, simulation/measurement campaign and other FR2 framework related work have been agreed in [4]. Further refinement is not precluded based on discussion outcomes in future meetings.**<br>**Observation 3: It's feasible to collect measurements results in volunteered labs with commercial devices for FR2 MIMO OTA requirement development.**<br>**Proposal 1: Approve the modifications of FR2 framework in the revised WID R4-223184, i.e., both pure measurement approach and hybrid of simulation and measurement approach will be considered for FR2 MIMO OTA requirements development.**<br>**Proposal 2: The feasibility of framework for FR2 MIMO OTA requirement development can be confirmed.** |

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## 2.1 Initial round

### 2.1.1 Proposals and comments collection

**Background Information:**

In current MIMO OTA WID, one checkpoint in this RAN-P remains for FR2 MIMO OTA framework:

- **FR2 MIMO OTA test methodology enhancement and leftovers**
  - Study and define the framework for FR2 MIMO OTA requirement development (1st priority)
    - Hybrid of simulation results and measurement results will be considered as the starting point in FR2 requirement definition
      - Note: Revisit in RAN#98 to check the feasibility and progress of hybrid simulation and measurement approach.
    - The correlation between simulation results and measurement results will be considered
    - Simulation assumptions agreed in R17 MIMO OTA WI can be considered as the baseline
    - Study how to handle the situation when not enough measurement results can be collected

In Q4 RAN4 discussion, FR2 MIMO OTA requirement development framework and work flow were agreed in R4-2220611 which considering both pure measurement approach and hybrid approach and the final selection pending further progress in RAN4 on number available measurement data:

**Issue 1-1: FR2 MIMO OTA requirements development framework update**

- Candidate options/proposals:
  - Proposal 1: Update the WID to include both Pure measurement approach and Hybrid simulation and measurement approach for FR2 MIMO OTA requirement development framework (QC, CAICT, vivo, Xiaomi ?)
  - Proposal 2: The feasibility of FR2 MIMO OTA framework shall be confirmed by RAN #99. Down selection will be done before performance part started. (vivo)
  - Proposal 3: The feasibility of FR2 MIMO OTA framework can be confirmed (CAICT, Xiaomi)
  - Proposal 4: The simulation efforts and measurement efforts can be conducted in parallel before RAN4 makes the decision on selecting either Pure measurement approach or Hybrid simulation and measurements approach. (Qualcomm)
- Recommendations from moderator: It's moderator's understanding all the companies fine with proposal 1 which aligned with RAN4 latest agreement. For other proposals, please provide your comments and feedback.

- Approve proposal 1, and further discuss other proposals.

**Feedback Form 1: Comments on issue 1-1**

**1 – Guangdong OPPO Mobile Telecom.**

Ok with proposal 1, 3, and 4. Whether hybrid can be used as the approach depends on how many devices can be tested, parallel discussion is ok.

**2 – Beijing Xiaomi Mobile Software**

Agree with moderator's proposal. For the pure measurement method and the hybrid measurement method, we can agree on the parallel progress and to further collect the volunteer information and discuss the device number needed to finalize the requirement.

**3 – Qualcomm Incorporated**

Agree with recommended WF on proposal 1 from the moderator.

Per our understanding, the feasibility for Pure measurement approach and Hybrid simulation and measurement approach can be confirmed based on the agreements on framework from RAN4#105. But the details such as the minimum number of measurement· devices, etc., need to be further discussed in RAN4 in future meetings.

Therefore, we support proposal 1, 3 and 4.

**4 – CAICT**

No matter how many commercial devices measurement results we can collect in the test campain phase, the currently agreed framework has corresponding solutions, i.e., to implement pure measurement methods or hybrid methods. RAN4 has also made good progress on several key issues related to the feasibility of FR2 framework.

1. Test labs. More than 4 volunteer labs claim to be willing to provide environment and efforts for lab alignment activity and measurement campaigns. According to offline feedback, more labs may be ready for this activity.

2. Performance alignment devices(PAD). At present, we have one commercial device as PAD, more PADs provided by vendors are encouraged. In an absence of volunteer companies providing PADs, RAN4's agreement is that companies can also purchase devices from the market for the lab alignment activity.

Therefore, we support to confirm the feasibility of FR2 MIMO OTA framework and further discuss the details in RAN4 level, e.g., the specific number of devices required for pure measurment approach.

**5 – vivo Communication Technology**

We support proposal 1. But regarding the feasibility, as we stated in our paper, we believe current version of the framework is something like an idea, but can not be confirmed as feasible to develop FR2 MIMO OTA requirement which was started 2 years ago…

Especially for the hybrid approach, many aspects have not been defined and still unclear to companies how to proceed. We believe it is premature to conclude that the framework is feasible now, we prefer to give more RAN4 time to check and study.

In addition, after confirming the feasibility, it is clear that RAN4 will just adopt single approach to define FR2 MIMO OTA minimum requirements, so down-selection is anyway needed. We are open to discuss what timing is perfect to do the down-selection decision, in RAN4 or RAN-P.

**6 – Samsung Electronics Co.**

We are OK with Proposal 1, 3 and 4. For Proposal 2, we still believe that RAN4 does not have to rule out the simulation work too early, e.g., in RAN#99. In our understanding, even though there is still some details needs to be refined for the framework, it is definitely feasible to have the discussion in parallel with the performance part.

**7 – ZTE Corporation**

We are fine with Proposal 1, 3 and 4. We also think parallel discussion (measurement+ simulation) is feasible.

**8 – ZTE Corporation**

We are fine with Proposal 1, 3 and 4. We also think parallel discussion (measurement+ simulation) is feasible.

**9 – Intel Corporation (UK) Ltd**

Support moderator's recommendation. For the remaining proposals, we are ok with Proposal 4.

**10 – Huawei Technologies France**

We are fine with the moderator proposal. Measurement and hybrid method could be adopted for further evaluation. Ok with other proposals as well. For proposal 2, since RAN4 would agree on the framework during RAN4 #106bis, which is before RAN#99.

**Issue 1-2: Others**

- Candidate options/proposals:
  - Proposal 1: Update the WID with removing the scope of introducing more FR1 channel models. (vivo)
  - Proposal 2: Other update as captured in revised WID RP-223184 (CAICT)
- Recommendation from moderator: Collect comments from companies in initial round

**Feedback Form 2: Comments on issue 1-2**

**1 – Guangdong OPPO Mobile Telecom.**

ok with proposal 2.

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| **2 – Beijing Xiaomi Mobile Software**<br>Agree with proposal 2.<br>For proposal 1, as RAN4 has agreed not to add more FR1 channel models, can we leave it as an agreement in the Status Report and not to further discuss? |
| **3 – Qualcomm Incorporated**<br>We support proposal 1 and 2. |
| **4 – CAICT**<br>support proposal 2 as proponent. |
| **5 – vivo Communication Technology**<br>We support proposal 1. The RAN4 agreement is an important decision of working scope of this WI, similar approach with other WID discussions (RAN1/2/4) in RAN plenary each meeting, the WID objectives should be updated to reflect correct working scope.<br>For proposal 2, the update of WID also dependent on the outcome of issue 1. |
| **6 – Intel Corporation (UK) Ltd**<br>We agree with both proposals |
| **7 – Huawei Technologies France**<br>Both proposal 1 and proposal 2 are fine for us |

Channel model validation
Lab alignment activity
Simulation platform validation activity
Measurement campaign: collect measurement data from aligned labs
Simulation campaign: collect simulation data from validated simulation platforms
Does the amount of measurement data exceed the threshold?
Yes
No
Adopt Pure measurement approach to specify performance requirements
Adopt Hybrid approach to specify performance requirements

**Figure 1:**

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### 2.1.2 First round summary and recommendation

**Issue 1-1: FR2 MIMO OTA requirements development framework update**

**Observation:**

- All the companies ok with proposal 1 and proposal 4.
- For proposal 3:
  - 6 companies (OPPO, QC, CAICT, ZTE, Huawei, Samsung) support this proposal
  - One company (vivo) shared the concern to confirm the feasibility at current moment especially for hybrid approach given many details still subject to further discussion in RAN4 and it's premature to conclude at this moment. vivo also pointed out the final selected approach between pure measure data approach and hybrid approach still subject to the progress in RAN4.

Based on the comments from companies, moderator suggests to approve proposal 1 and proposal 4. And for the feasibility of RAN4 agreed FR2 OTA requirements framework, it's true there are some details subject to RAN4 further progress and the refinement on the framework not precluded as busine as usual meanwhile it's moderator's understanding we may no need further guidance from RAN-P, RAN4 can proceed the work as planned.

Moderator suggests to approve proposal 1 and proposal 4 and for proposal 3&2, moderator suggests to add a note in the WID, "Down-selection will be done before performance started" and no need to further discussion on proposal 2 and 3.

**Recommendation from moderator:**

- Proposal 1: Update the WID to include both Pure measurement approach and Hybrid simulation and measurement approach for FR2 MIMO OTA requirement development framework. (Agreed)
- Proposal 4: The simulation efforts and measurement efforts can be conducted in parallel before RAN4 makes the decision on selecting either Pure measurement approach or Hybrid simulation and measurements approach. (Agreed)
- Proposal 5: Include a note into update WID for FR2 framework part "Down-selection between pure measurement approach and hybrid of simulation and measurement approach will be done before performance started" (for 2nd roud discussion)

**Issue 1-2: Others**

**Observation:**

- Besides FR2 framework part, all the companies fine with changes in the revised WID RP-223184.
- For the proposal 1 removing the scope of introducing more FR1 channel models from WID, no companies share concern on this proposal.

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Moderator suggest to update WID by removing the scope of introducing more FR1 channel models from WID; and FR2 frame work part pending on decision on issue 1-1.

For 2nd round discussion, we can focus on issue 1-1.

**Recommendation from moderator:**

- Proposal 1: Update the WID with removing the scope of introducing more FR1 channel models (Agreed)

## 2.2 Intermediate round discussion

### 2.2.1 Proposals and comments collection

For intermediate round discussion, moderator suggests to focus on issue 1-1 FR2 framework update part.

**Issue 1-1: FR2 MIMO OTA requirements development framework update**

Moderator would like to check whether the proposal 5 suggested by moderator can be acceptable for WID update.

Proposal 5: Include a note into update WID for FR2 framework part "Down-selection between pure measurement approach and hybrid of simulation and measurement approach will be done before performance started" i.e. revised WID as following:

**Table 3:**

- Both pure measurement approach and hybrid~~Hybrid~~ of simulation ~~results~~ and measurement ~~results~~ approach will be considered ~~as the starting point in~~for FR2 requirement definition
  - ~~Note: Revisit in RAN#98 to check the feasibility and progress of hybrid simulation and measurement approach.~~
  - Note: Down-selection between pure measurement approach and hybrid of simulation and measurement approach will be done before performance started

**Feedback Form 3: Comments on proposal 5**

**1 – Meta Ireland**

Fine with the moderator proposals.

**2 – CAICT**

Thanks moderator for the good summary! In general, we are ok to add a note in the WID although we think that the current framework has clearly indicated that the down selection will be done based on the number of measurement results (see the workflow in RP-223186).

One thing to be confirmed is that per our understanding, the down-selection is based on the number of measurement results, which means we need first start the measurement campaign in performance part, and then specify FR2 requirements according to the selected approach.

Therefore, we propose the following modifications:

Note: Down-selection between pure measurement approach and hybrid of simulation and measurement approach will be done before ~~performance started~~specifying FR2 performance requirements.

**3 – Samsung Electronics Co.**

We generally are fine with moderator's proposal. However, we also share the view with CAICT which is to use "specifying FR2 performance requirements" instead of "performance started" as we mentioned during the 1st round. We support CAICT's revision.

**4 – Qualcomm Incorporated**

Thanks much moderator for the efforts and good summary. We support adding one note in the WID. For the wording, we share the similar view as CAICT that we might need more time to figure out the measurement device number and other details on the measurement activity before selecting between approaches. Therefore, it is not guaranteed that we can complete the down-selection between approaches before the performance part starts (i.e,., RAN4106bis). With that, we prefer the modifications from CAICT.

**5 – vivo Communication Technology**

Many thanks to moderator for the good summary and proposals. We are OK with adding a note.

We also understand CAICT and QC concerns about the wording, but seems if remove that then the deadline would be the final RAN4 meeting of this WI... in that sense we can not accept remove performance started. An alternative way would be we select a RAN check point as tentative timing before closure of WI core part to make the down-selection of framework, e.g. RAN#101.

**6 – Beijing Xiaomi Mobile Software**

We are fine with moderator's proposal.

**7 – Huawei Technologies France**

We are fine with the moderator proposal. Modification by CAICT is ok for us.

**8 – ZTE Corporation**

We are ok with the moderator's proposal and also fine with the further modification by CAICT.

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| **9 – Intel Corporation (UK) Ltd**<br>Including a note in revised WID is agreeable and the original note proposed by moderator is ok for us. The changes proposed by CAICT are in our view are equivalent to the original note proposed by moderator and are also acceptable. |
| **10 – CAICT**<br>My understanding is that in common cases, the discussion of specifying the requirement will last for serveral RAN4 meetings, so complete the down-selection before ”specifying FR2 performance requirement” doesn’t mean that the deadline will become the end of the WI.<br>We have similar understanding with moderator that we can further refine the framework and address company’s concerns in RAN4, and we may not need further guidance from RAN-P. |

### 2.2.2 Intermediate round summary

CAICT sugguested a modification on the proposed note. Almost all other companies ok with modification as suggested by CAICT. vivo shared concern on the timeline for the down-selection of the framework.

Moderator suggests to agree below note to avoid further debate as a compromise in this RAN-P.

Proposal 5a: Include a note into update WID for FR2 framework part “Down-selection between pure measurement approach and hybrid of simulation and measurement approach is suggested to be done before the completion of core part.”

## 2.3 Conclusion

**Proposal 4 under issue 1-1 approved**

- Proposal 4: The simulation efforts and measurement efforts can be conducted in parallel before RAN4 makes the decision on selecting either Pure measurement approach or Hybrid simulation and measurements approach.

**T-doc status:**

- RP-223081, 3110, 3156, 3186 Noted
- RP-223184 revised to RP-223509, RP-223509->Approved

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