**3GPP TSG-RAN WG4 #** **116-bis R4-2514589**

**Prague, Czech Republic, 13th October 2025 – 17th October 2025**

**Agenda item:** 8.1

**Source:** Feature lead (MediaTek inc.)

**Title:** Adhoc meeting minutes for [116bis][106] 6G Demod

**Document for:** Approval

# Introduction

This document captures Ad-hoc discussion for FS\_6G\_Radio under AI 8.8 corresponding to RAN4 driven non-AI demod topics at RAN4#116bis.

# Topic #1: 6G demod

## Open issues summary

### Sub-topic 1-4: TxEVM and SNR

**Issue 1-4-1: TxEVM aspects**

* Proposals
  + Option 1: Study what EVM simulations assumptions should be used in demodulation and CSI requirements (MediaTek)
    - Option 1A: Study impact of TX EVM for higher modulation order/ MIMO layers on Demodulation requirements (Apple)
    - Option 1B: RAN4 shall abandon the SNR operating point limitations via fixed 20dB rule, or fixed TE TxEVM assumptions, and adopt a SNR limitation derivation based on actual TDRA/FDRA configuration (Nokia)
    - Option 1C: RAN4 should study whether the TxEVM requirements for the base station, at least in the simulations for deriving the demodulation requirements, could be tightened (Qualcomm)
* Recommended WF
  + More discussion is needed.

**Issue 1-4-2: SNR aspects**

* Proposals
  + Option 1: To ensure good field coverage, the SNR values in the demodulation requirements should follow the SSB SNR values that can be measured in existing 5G NR scenarios and those SSB SNR values that can be expected in upcoming 6G deployments (Qualcomm)
  + Option 2: RAN4 should study whether the coverage range for relevant field scenarios can be extended by defining demodulation requirements for larger SNR values as currently being used in 5G NR (Qualcomm)
  + Option 3: RAN4 should study whether the coverage range for relevant field scenarios can be extended for carrier aggregation. It should also be studied whether the SNR requirement should be dependent on the number of component carriers (Qualcomm)
  + Option 4: RAN4 shall abandon the SNR operating point limitations via fixed 20dB rule, or fixed TE TxEVM assumptions, and adopt a SNR limitation derivation based on actual TDRA/FDRA configuration. (Nokia)
* Recommended WF
  + More discussion is needed.

**Feature Lead starting point for discussion:**

Discuss if it can be agreed to study OLLA in 6G demod

* We can check if proposed OLLA model from R4-2300703 can be assumed as a starting point (update suggestions are still welcome)
  + Other options are not precluded if new proposals are introduced in next meetings

**Ad-hoc discussion:**

Nokia: TxEVM we discuss here is for baseband and not related to RF. You cannot connect these together. We have specific test case in demod side.

Huawei: We support to use more practical TxEVM values rather than minimum requirement values in RF spec. We need more feedback from BS vendors.

CMCC: We support to investigate more TxEVM and SNR assumptions. We may need more infra vendor input.

Samsung: We think we should follow TxEVM requirements in RF also in demod. There has been lot of unnecessary TxEVM discussions in 5G requirement work.

Qualcomm: We agree with Nokia’s comment and disagree with Samsung comment. We should check what are practical SNR values observed in field.

Nokia: We have TxEVM limitations from TE.

Huawei: RAN1 is discussing constellation shaping and other topics that may impact this discussion and it may be better to postpone discussion. In RAN4 testing we normalize beamforming gain and we cannot directly compare SNR observed in field. We agree to discuss more TxEVM, but potentially later.

Apple: We see that there should be some connection between BS TxEVM requirements and demod assumptions. We need to have TxEVM assumption in demod in the future. Is there connection to field observations or not?

Ericsson: We first need to define RF TxEVM before we can define demod TxEVM.

Samsung: RAN4 high level guidance is more realistic scenarios TxEVM limitation should not be from TE but from BS.

Keysight: We are fine to define TxEVM for demod. There is practical limitation of SNR in TE.

Nokia: We are wondering why we are now mixing discussion between RF and demod. BS in practice is optimizing TxEVM to each transmission condition.

ZTE: We now discuss only TxEVM. How about RxEVM?

Qualcomm: We can see high SSB SNR more than 30dB in field. We must do something for this topic.

### Sub-topic 1-6: Performance testing and requirement

**Issue 1-6-2: Demodulation testing**

* Proposals
  + Option 1: For 6G demodulation study, use FRC style, MCS value, fixed rank, fixed channel bandwidth, fixed subframe configuration as a starting point (Samsung)
  + Option 2: Study extending scope of demodulation tests with link adaptation (MediaTek, Qualcomm)
  + Option 3: RAN4 needs to discuss the additional margins and measurements uncertainty for requirements definition of 6GR (ZTE)
  + Option 4: RAN4 needs to discuss the SNR derivation procedure for 6GR, the span of ideal results span is <= [X] dB. (ZTE)
  + Option 5: Define baseline SRS based precoding procedure in TE to enable aligned simulation assumptions (MediaTek)
* Recommended WF
  + More discussion is needed.

**Feature Lead starting point and ideas for discussion:**

* Option A: UE sends SRS, TE receives SRS through the channel, SRS is estimated, Precoder is calculated based on SRS
  + Note, TEs may usually assume ideal uplink and this may be impractical and difficult to implement.
* Option B: TE uses ideal channel knowledge, adds AWGN on channel knowledge, calculate precoder, add processing delay to use precoding

**Ad-hoc discussion:**

Nokia: No strong concerns. Preference on Option A.

Qualcomm: Discuss pros/cons. Option A and B can be studied. Need feedback from TE vendors.

Apple: What is value of TE calculated precoder. We want to understand the motivation better.

R&S: We are open to study. What is the actual goal. Define clear goal in WF.

Nokia: Use case and purpose needs to be clarified here.

Qualcomm: We test TDD with random PMI or follow PMI but not with SRS based precoding utilizing channel reciprocity.

Huawei: Reciprocity can be used for feature depending on BS behavior.

CT: The most important part is to calculate precoder correctly based on SRS in BS.

Apple: What is the impact on UE demod if SRS based precoding would be used.

Samsung: Purpose needs to further clarified. Option B is emulation of real thing.

Qualcomm: We want to test in more realistic conditions. We may need to have SRS test also for BS.

MTK: We see this as potential improvement to enable testing in more realistic conditions. We support to study SRS based precoding in 6G demod study. Definition of BS emulating TE functionalities has been very challenging in RAN4 and we need to start early to be able to succeed.

R&S: We see many opinions. This is just the first meeting.

CMCC: Want to understand better downlink testing. What is the difference in UE side to receive SRS based precoder vs PMI reporting based precoder.

Ericsson: It is not only about how to calculate precoder from SRS but about SRS signal itself.

**Issue 1-6-5: New dynamic TE functionalities**

* Proposals
  + Option 1: RAN4 to study inclusion of higher layer aspects in demodulation requirements via increased and dynamic application of DUT feedback in the TE. (Nokia)
  + Option 2: RAN4 to study inclusion of higher layer aspects in demodulation requirements via dynamic TE decisions using known algorithms, e.g., SU/MU scheduling, dynamic resource allocation/slots, applying timing offset reports (CJT), OLLA, etc. (Nokia)
  + Option 3:RAN4 should explore utilizing test equipment algorithms to evaluate features that rely on network-side processing, enabling realistic UE performance assessment without limiting network implementation flexibility. (Qualcomm)
  + Option 4:RAN4 should identify features dependent on network-side processing and aim to define corresponding performance requirements, where feasible, using test equipment-based evaluation methods. (Qualcomm)
* Recommended WF
  + More discussion is needed.

**Feature Lead starting point for discussion:**

Discuss if it can be agreed to study other TE related processing in 6G demod

* Check if we can have list of topics to study
  + TO/FO/PO feedback and precompensation in TE
  + SU/MU scheduling
  + Something else?

**Ad-hoc discussion:**

Huawei: We need to define some TO/FO/PO functionality to TE. For scheduling we have more concerns. In the next we can propose more functionalities for study.

Samsung: We are open to discuss TO/FO functionalities for TE. We would like to understand better the intention of dynamic scheduling.

Nokia: Actually, this TO/FO/PO is related to SRS based precoding discussion. We target to have more dynamic scheduling than just fixed FRC. State transition to be covered in demod.

Qualcomm: In Rel18/19 TO/FO related issues are discussed in RRM instead of demod. Currently we are incapable to test all RAN1 features in RAN4. Concerns on dynamic MU scenarios.

Apple: We see value in this framework because we have skipped several tests because we cannot test it. We miss expected network behavior definition. It does not need to be UE test only, some of advanced features could be tested also in BS.

R&S: Now it good time to study these. Come up with list of useful items. What is purpose of each feature.

Qualcomm: In our paper we have few examples. Port selection codebook one example. We need to come up with some simulation assumption of network behavior or functionality.

Ericsson: This is potentially too early because RAN1 decisions may impact what is relevant for 6G.

Nokia: We always have challenges to define BS side functionalities. We can target to define reference functionalities.

R&S: We hope to focus discussion to relevant issues.

Nokia: We are fine to call these as test reference implementation.

Samsung: In this meeting It is difficult to reach consensus on this issue and suggest to check other topics.