**3GPP TSG-RAN Meeting #89-e RP-200xxx**

**Electronic Meeting, 14 - 18 September, 2020**

**Agenda item:** x.x

**Source:** Moderator (China Telecom)

**Title:** Email discussion summary for RAN4 Rel-17 demodulation scope

**Document for:** Discussion

# Introduction

**Scope:**

According to the work areas of RAN4 R17 non-spectrum related WI/SIs endorsed at RAN #88e [1], this email thread will discuss the RAN4 Rel-17 demodulation scope, based on the initial inputs from [2] - [6].

Meanwhile, the way forward on NR Application Layer Throughput Performance was endorsed at RAN #88e [7], and the detailed objectives and scope on RAN4 study for VRC will also be discussed in this thread.

**Target and time schedule:**

* Companies are invited to provide comments in section 1.2, 2.2, 3.2 4.2, 5.1 and 5.2 (till Sept. 3)
  + - An intermediate summary will be submitted to the August RAN4 meeting.
    - The final summary will be submitted to RAN#89e.
* The corresponding WID and SID update will be submitted to RAN#89e.

# UE advanced receivers

## Companies’ proposals summary

Candidate objectives for UE advanced receivers [2] - [6]:

* Scenario a): Inter-cell interference
  + - Target frequency: FR1 and/or FR2
    - Reference receiver:
* MMSE-IRC with DMRS based interference covariance estimation
* MMSE-IRC with data based interference covariance estimation
  + - Type of requirements: PDSCH and the corresponding CQI reporting requirement
    - Rx antenna number: 2Rx; 4Rx (for FR1 only)
    - Interference profile: LTE interference profiles can be used as a starting point for NR FR1 scenarios
    - Discuss if additional network assistance is required
* Scenario b): Inter-layer interference for SU-MIMO
  + - Target frequency: FR1 and FR2
    - Reference receiver: soft IC
    - Type of requirements: PDSCH and the corresponding CQI reporting requirement
    - Number of data layers: up to 4 for FR1, 2 for FR2
    - Rx antenna number: 2Rx; 4Rx (for FR1 only)
* Scenario c): Intra-cell inter-user interference for MU-MIMO
  + - Target frequency: FR1 and/or FR2
    - Reference receiver: RML, SLIC
    - Type of requirements: PDSCH and the corresponding CQI reporting requirement
    - Rx antenna number: 2Rx; 4Rx (for FR1 only)
    - Discuss if additional network assistance is required

## Companies views’ collection

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| --- | --- |
| Company | Comments |
| Company A | xxxx |
| Company B | xxxx |
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## Summary

# BS advanced receivers

## Companies’ proposals summary

Candidate objectives for BS advanced receivers [4] - [6]:

* Scenario a): Inter-cell interference
  + - Target frequency: FR1 and/or FR2
    - Reference receiver:
* MMSE-IRC with DMRS based interference covariance estimation
  + - Type of requirements: PUSCH requirement
    - Rx antenna number: 2Rx; 4Rx and 8Rx (for FR1 only)
    - Interference profile: LTE interference profiles can be used as a starting point for NR FR1 scenarios
    - Discuss if additional network assistance is required
* Scenario b): Inter-layer interference for SU-MIMO
  + - Target frequency: FR1 and FR2
    - Reference receiver: soft IC
    - Type of requirements: PUSCH requirement
    - Number of data layers: 2 for FR1 and FR2
    - Rx antenna number: 2Rx; 4Rx and 8Rx (for FR1 only)
* Scenario c): Intra-cell inter-user interference for MU-MIMO
  + - Target frequency: FR1 and/or FR2
    - Reference receiver: Hard-IC (hard L-CWIC), hybrid-IC (mixing hard-IC and soft-IC) as defined in NOMA TR 38.812
    - Type of requirements: PUSCH requirement
    - Rx antenna number: 2Rx; 4Rx and 8Rx (for FR1 only)

## Companies views’ collection

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| Company | Comments |
| Company A | xxxx |
| Company B | xxxx |
| Nokia, Nokia Shanghai Bell | It is our opinion that no specific receiver structures should be forced to be implemented via the WID. The detailed structure for any and all scenarios should be up to implementation.  For baseline evaluations we see it useful to aim for the LTE advanced receiver (MMSE-IRC + codeword-level interference cancellation), if such an alignment is found to be required.  The WID should make it clear that the inclusion of interference aware receivers is subject to consensus on the usefulness of such requirements. |
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## Summary

# BS FR1 PUSCH 256QAM

## Companies’ proposals summary

Candidate objective [4] [5]:

* Define PUSCH demodulation requirements for FR1 256QAM

## Companies views’ collection

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| Company | Comments |
| Company A | xxxx |
| Company B | xxxx |
| Nokia, Nokia Shanghai Bell | We are positive towards the inclusion of FR1 256QAM PUSCH demodulation requirements. It is our understanding that minimal mobility is to be assumed, and realistic phase noise modelling is left up to the contributing entities. |
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## Summary

# Link adaptation throughput requirements

## Companies’ proposals summary

Candidate objectives [7] [8]:

* Study the feasibility of defining requirements with link adaptation
  + - Analyze in which scenarios absolute physical layer throughput requirement can be defined
      * Use currently defined RI test setup in 38.101-4 as baseline
      * Use the parameters suggested by RAN5 in R5-195422 as baseline
        + Other scenarios are not precluded if above parameters are not found feasible
* Possible RAN4 work plan
  + - Initial Simulation Assumptions
      * Reuse test parameters used in existing Rank Indication test cases in 38.101-4 as much as possible.
    - Alignment of results
      * Companies to present simulation results, multiple rounds of simulation might be needed
      * Refinement of simulation assumptions if needed
    - Conclusion
      * Tests to be declared feasible for the scenarios in which there is good alignment between results
      * Feasibility to be concluded if results from multiple companies are within +/- X % (e.g. 5%) of average LA throughput

## Companies views’ collection

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| Company B | xxxx |
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## Summary

# Other new proposals

## New proposal on UE demodulation requirements

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| Company B | xxxx |
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## New proposal on BS demodulation requirements

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| Company B | xxxx |
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## Summary

# Conclusions

# References

1. RP-201331, Work areas of RAN4 R17 non-spectrum related WI/SIs, RAN4 Chairman (FUTUREWEI), RAN #88e, 29 June - 3 July 2020.
2. RP‑200615, Motivation paper of new WID on performance requirements for UE advanced receiver in Rel-17, Huawei Technologies Japan K.K, RAN #88e, 29 June - 3 July 2020.
3. RP‑200616, New WID proposal: Performance requirements for UE advanced receiver in Rel-17, Huawei Technologies Japan K.K, RAN #88e, 29 June - 3 July 2020.
4. RP‑200729, Motivation for further enhancement on NR demodulation performance requirements, China Telecom, RAN #88e, 29 June - 3 July 2020.
5. RP‑200730, New WID: Further enhancement on NR demodulation performance, China Telecom, RAN #88e, 29 June - 3 July 2020.
6. RP‑201118, Views on Rel-17 NR Demodulation requirements, Intel Corporation, RAN #88e, 29 June - 3 July 2020.
7. RP-201377, Way forward on NR Application Layer Throughput Performance Work in RAN4, Qualcomm Incorporated, RAN #88e, 29 June - 3 July 2020.
8. RP-201001, Way forward on NR Application Layer Throughput Performance Work in RAN4, Qualcomm Incorporated, RAN #88e, 29 June - 3 July 2020.