3GPP TSG-RAN WG4 meeting #95-e R4-2008877

Electronic Meeting, 25 May – 5 June 2020

**Agenda item:** 5.10.4

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [95e][313] LTE\_eMTC5\_Demod

**Document for:** Information

# Introduction

This email discussion targets to sort out the open issues on the UE demodulation/CSI reporting requirements and BS demodulation requirements for Rel-16 eMTC.

This email discussion also targets the review of CR and collect the simulation results for MPDCCH demodulation requirements and CSI-RS based PMI reporting test.

Candidates target of email discussion for 1st round and 2nd round:

* 1st round:
  + Collect companies view on the open issues
  + Collect simulation results for MPDCCH demodulation and CSI-RS based PMI reporting test
  + Collect comments for CRs for MPDCCH demodulation and CSI-RS based PMI reporting test
* 2nd round:
  + Sort out the open issues.
  + Discuss whether CRs can be endorsed.

# Topic #1: Open issues on UE/BS demodulation requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2007111 | Nokia, Nokia Shanghai Bell | Observation 1: For multi-TB scheduling, the performance benefit can be reasoned by increased time diversity of the radio channel due to interleaved mode rather than refinements to PHY layer reception.  Proposal 1: Proposal 1: No separate UE / BS demodulation requirements are required for interleaved multi-TB transmission for PDSCH / PUSCH. |
| R4-2007208 | Huawei, HiSilicon | Observation1: The gain can be 1.8dB when 8TB and 64 repetition are configured  Observation 2: There is a gain of 1.27dB for CE Mode B when configure 4TBs and 64 Repetitions, and 1.41dB for CE Mode A when configure 8TBs and 64 Repetitions  Proposal1: Define performance requirements for multi-TB scheduling for PUSCH in additional MTC enhancement  Proposal1: Define performance requirements for multi-TB scheduling for PDSCH in additional MTC enhancement |
| R4-2007373 | Ericsson | Observation: No performance difference between the single TB transmission and interleaved multi-TB transmission (2TB or 4TB) with the existing RAN4 eMTC demodulation requirement parameters.  Proposal 1: RAN4 does not define new PDSCH demodulation requirements with multi-TB scheduling.  Proposal 2: RAN4 does not define new PUSCH demodulation requirements with multi-TB scheduling. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1: PUSCH/PDSCH demodulation requirements with multi-TB scheduling

*Sub-topic description:*

Sort out the remaining open issues on Rel-16 eMTC demodulation requirements, i.e., whether to introduce new PUSCH/PDSCH demodulation requirements with multi-TB scheduling.

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1: How to understand the following “Objective of Performance part WI” captured in WID RP-192875**

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| **Scheduling enhancement:**   * Specify scheduling multiple DL/UL transport blocks with single DCI for SC-PTM and unicast [RAN1, RAN2]  4.2 Objective of Performance part WI Specify necessary performance requirements, measurement accuracy requirements and test cases related to the above-mentioned enhancements and core requirements. |

* Proposals
  + Option 1: Specify necessary performance requirements figured out by RAN4 for the core requirements
  + Option 2: No any performance requirements need to be defined for the defined core requirements
* Recommended WF
  + All the following open issues are dependent on this conclusion

**Issue 1-1-2: Whether to define PUSCH demodulation requirements with multi-TB scheduling?**

* Proposals:
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + Collect companies view.

**Issue 1-1-3: Whether to define PDSCH demodulation requirements with multi-TB scheduling?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + Collect companies view.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Issue 1-1-1: In order for a test to be defined, two conditions need to be met: 1) different UE behavior that has not been tested before; 2) significant gain compared to behavior without the feature. If neither of these conditions are met, there is no need for new test regardless of what the WID says.  Issue 1-1-3: We support option 2 as in previous meetings. The gain from multi-TB scheduling does not introduce a new UE behavior and is not even significant (based on Ericsson’s simulation results). |
| Samsung | **Issue 1-1-2: Whether to define PUSCH demodulation requirements with multi-TB scheduling?**  Our preference is option 2 which we already explained the detailed analysis in previous RAN4 meetings. These issues have been discussed over several meetings and companies’ position no changed. Not sure how to proceed considering the polarized views. Suggest to treat on GTW session and seek for session chair guild-line.  **Issue 1-1-3: Whether to define PDSCH demodulation requirements with multi-TB scheduling?**  Same comments as issue 1-1-2. |
| Huawei, HiSilicon | Issue 1-1-1, 1-1-2, 1-1-3: RAN4 should discuss and figure out the necessary requirements to define among those features listed by the WID. We agree that new UE behaviors and significant gain are the conditions for introducing new test cases. But there are different observations over the simulation results and companies have different views on whether the gain is significant.  Therefore, we would prefer a further discussion on it. |
| Ericsson | Issue 1-1-1: It is a tricky question. If we check several WIDs, some WIDs do not mention RAN4 is involved in the objective, but RAN4 performance part introduced the requirements without any such a discussion. Since there is no strict rule/format for WID, we can only say it is up to RAN4.  Issue 1-1-2/1-1-3: We have similar view as Qualcomm. It is not realistic to define UE/BS demodulation requirements covering all the features introduced by RAN1. Therefore RAN4 has chosen test cases depending on several reasons such as to show the performance gain, to verify the baseband processing (e.g., advanced receiver), or with operators’ request. For eMTC multi-TB transmission, our simulation results show no performance difference and we don’t think any changes in the demodulation algorithm. Therefore our preference is Option 2, no new requirements. |
| Nokia | Issue 1-1-1: We share the concerns raised by Qualcomm and Ericsson. Multi-TB scheduling does not require performance tests in RAN4, other features will require them. In our view, there is no rationale to specify performance / consider tests for corner cases (maximum number of TBs, high TBS and high repetitions at the same time).  Issue 1-1-2: We support option 2.  Issue 1-1-3: We support option 2. |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going Wis, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1-1** | * PUSCH demodulation requirements with interleaved multi-TB transmission   + 1 company proposes to discuss further   + 3 companies propose not to define requirements * PDSCH demodulation requirements with interleaved multi-TB transmission   + 1 company proposes to discuss further   + 4 companies propose not to define requirements   1 company want to discuss further whether to define PDSCH/PUSCH demodulation requirements with multi-TB transmission, although other companies do not think it is necessary because of no performance gain and no receiver algorithm changes.  *Recommendations for 2nd round:*  The situation does not change from November 2019, and [95e][314] NB\_IOTenh3\_Demod also has the similar issue. Moderator recommends to discuss this issue in the 2nd round again, but if no progress, moderator also propose to discuss it in GTW.  **Issue 1-1-2: Whether to define PUSCH demodulation requirements with multi-TB scheduling**   * Option 1: Yes * Option 2: No   **Issue 1-1-3: Whether to define PUSCH demodulation requirements with multi-TB scheduling**   * Option 1: Yes * Option 2: No |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | Way forward on UE/BS demodulation performance for additional MTC enhancements for LTE  (Capture both the agreements in Sub topics #1 and #2) | Ericsson |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | Issue 1-1-2:  Issue 1-1-3: |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Simulation result collection

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2007209 | Huawei, HiSilicon | MPDCCH simulation results |
| R4-2007210 | Huawei, HiSilicon | PMI reporting test simulation results |
| R4-2007371 | Ericsson | MPDCCH simulation results |
| R4-2007372 | Ericsson | Observation 1: Throughput gain of 1.4 is achieved with 70% of maximum throughput with follow PMI.  Proposal 1: Set γ=1.2 for CSI-RS based PMI reporting test for non-BL UE at the SNR where 70% of the maximum throughput is achieved with the follow PMI. |
| R4-2007372 | Ericsson | Simulation summary |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1: MPDCCH demodulation requirements

*Sub-topic description:*

Collection of MPDCCH simulation results.

*Open issues and candidate options before e-meeting:*

**Issue 2-1-1: Collection of simulation results**

Collect the simulation results in R4-2007372 “Summary of simulation results for Rel-16 eMTC demodulation requirements”.

### Sub-topic 2-2: CSI-RS based PMI reporting test

*Sub-topic description*

Discuss the requirements for CSI-RS based PMI reporting test for non-BL Ues.

*Open issues and candidate options before e-meeting:*

**Issue 2-2-1: Requirements of CSI-RS based PMI reporting test.**

* Proposals
  + Option 1: Set γ=1.2 for CSI-RS based PMI reporting test for non-BL UE at the SNR where 70% of the maximum throughput is achieved with the follow PMI.
  + Option 2:
* Recommended WF
  + Agree with option 1.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei, HiSilicon | Issue 2-2-1: Agree with recommended WF. |
| Ericsson | Issue 2-2-1: Support the recommended WF. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2007374 | Moderator: According to the chairman’s suggestion, this CR will be endorsed even if it is agreeable in order to avoid TBD or [] in the specification. |
| Qualcomm: We don’t recall discussing the simulation assumptions in the context of TDD. So we’re not sure if TDD part should be added in this meeting. |
| Huawei: We think we haven’t discuss whether to introduce TDD requirements in the previous meetings. So we didn’t provide our simulation results related to the TDD. But we are ok to introduce it. |
| Ericsson: For Qualcomm/Huawei, it is true we have discussed the simulation assumption of FDD/HD-FDD so far. But our CR basically reuses the simulation assumption of FDD/HD-FDD. Since we don’t intend to approve it in this meeting, companies can check the parameters until the next meeting. |
| R4-2007375 | Moderator: According to the chairman’s suggestion, this CR will be endorsed even if it is agreeable in order to avoid TBD or [] in the specification. |
| Company A |
| Company B |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#2-1** | **Collection of simulation results**  *Recommendations for 2nd round:*  Continue to collect the results in the 2nd round period. Ericsson to be upload the final version to the inbox together with the 2nd round summary. |
| **Sub-topic#2-2** | **Requirements of CSI-RS based PMI reporting test.**  *Agreements:*  Set γ=1.2 for CSI-RS based PMI reporting test for non-BL UE at the SNR where 70% of the maximum throughput is achieved with the follow PMI.  *Recommendations for 2nd round:*  No discussion is needed. |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2007374 | Postpone to the next meeting.  Interested companies can review the CR. |
| R4-2007375 | Postpone to the next meeting.  Interested companies can review the CR. |

## Discussion on 2nd round (if applicable)

No discussion is expected.

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |