**3GPP TSG-RAN WG4 Meeting # 96-e R4-200XXXX**

**Electronic Meeting, 17 – 28 Aug., 2020**

**Agenda item:** 7.18.3

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [96e][325] BS demodulation for 2-step RACH

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2010283 Discussion and simulation results for BS 2-step RACH requirement | Samsung | Proposal 1: 3 DMRS can be configured for MsgA PUSCH requirement  Proposal 2: Define the PUSCH mapping type A in FR1 and mapping type B in FR2 for NR 2-step RACH MsgA PUSCH requirement.  Proposal 3: 0.8us can be considered as the maximum timing offset for MsgA PUSCH  Proposal 4: MCS 0 can be selected for requirement with NR step RACH, to fulfill the targeting TBS with 56-72bits  Proposal 5: Using BLER 0.1 as the test metric for requirement of MsgA PUSCH  Observation 1: Similar BLER performance can be achieved with 2 DMRS and 3 DMRS configuration  Observation 2: With small value of TO, the impact on BLER performance of MsgA is minor without TO compensation  Observation 3: With TO larger than CP, even with TO compensation operation, large performance degradation is still existed  Proposal 6: Do not define the requirement with timing offset lager than CP |
| R4-2010783 Further discussion on BS demodulation performance requirements for 2-Step RACH | ZTE | Proposal 1: BS demodulation performance requirements are defined with TO compensation  Proposal 2: Change the lower end values for medium level TO cycling to 0µs as high level TO cycling.  Proposal 3: Scaling X:∆t:Y between two different SCSs for high level TO cycling as medium level TO cycling  Proposal 4: Set medium and high level TO cycling values as Table – 4 and Table – 5 respectively.  Proposal 5: Specify BS demodulation performance requirements for mapping type A and type B respectively.  Proposal 6: Set test metric to BLER 0.1 for BS demodulation performance requirements for 2-step RACH.  Proposal 7: Specify BS demodulation performance requirements with DMRS configuration 1+1+1.  Proposal 8: Specify BS demodulation performance requirements for 2-step RACH under FRC tables as Table-6 and Table-7 for FR1 and FR2 respectively. |
| R4-2010784 Draft CR for 38.104: Performance requirements for 2-Step RACH | ZTE |  |
| R4-2010785 Simulation results for 2-step RACH BS demodulation requirements | ZTE |  |
| R4-2010842 2-step RACH demodulation requirements | Ericsson | Proposal 1: Adopt option 2 (4 PRB, DM-RS 1+1, 7 symbol for FR1, 5 for FR2)  Proposal 2: Include a declaration whether “medium” T0 and associated requirements are supported or alternatively “high” T0 is supported. Only one set of requirements to be applicable/tested depending on declaration.  Proposal 3: 1% BLER |
| R4-2010906 2-step RACH BS demodulation simulation results | Nokia |  |
| R4-2010907 On 2-step RACH BS demodulation requirements | Nokia | Proposal 1: RAN4 not to deviate from current PUSCH applicability rules and BS needs to only comply for the mapping type declared to be supported in D.100.  Observation 1: Most of the PUSCH performance requirements use SNR at 70% throughput as a test metric, which maps to 30% BLER.  Observation 2: Simulation results from previous meetings show significant SNR differences when considering PUSCH performance with uncorrected TO at 10 % BLER and 70 % TPUT [4] [5] [6].  Proposal 2: RAN4 for define MsgA PUSCH performance requirements using a 10% BLER metric.  Observation 3: High Level TO cycling upper limit for the 30 kHz SCS test case is the most challenging one when compered to the C length.  Proposal 3: RAN4 to review the upper limit of the High Level TO cycling for the 30 SCS scenario, and use (X, ∆t, Y) as (0, 0.1, 1.9).  Observation 4: Medium TO level ranges and High TO ranges have similar average value.  Proposal 4: RAN4 to consider TO ranges starting at zero for Medium and High TO ranges.  Observation 5: 2-step RACH demodulation requirements relate mostly to the MsgA PUSCH performance, and has more relation to the existing PUSCH clauses than with the PRACH clauses.  Proposal 5: RAN4 to define 2-step RACH demodulation performances as a subclause in the clauses 8.2 for PUSCH requirement in 38.141-1 [4], 38.141-2 [5], and 38.104 [6] as:  -TS 38.141-1: 8.2.6 Performance requirements for MsgA PUSCH  -TS 38.141-2: 8.2.6 Performance requirements for MsgA PUSCH  -TS 38.104: 8.2.6 Requirements for MsgA PUSCH |
| R4-2011009 Discussion and simulation results on NR 2-step RACH BS performance requirements | Huawei | Observation 1: The performance between high level TO and medium TO level is negligible after TO compensation.  Observation 2:  – For 15kHz, 30kHz and 120kHz SCS, considering TO compensating or not, there is about 1~2dB performance differnece for medium level TO and about 6~7dB performance differnece for high level TO.  – For 120kHz SCS, considering TO compensating or not, there is about 3~6dB performance differnece for both medium level TO and high level TO.  Proposal 1: Only define high level TO cases for NR 2-step RACH.  Proposal 2: Define both Type A and Type B for both FR1 and FR2 for NR 2-step RACH demodulation requirements. Only the mapping type declared to be supported in D.100 shall be tested. If both mapping type A and type B are declared to be supported, the tests shall be done for either type A or type B.  Proposal 3: Define 1% BLER for 2-step RACH requirements definition.  Proposal 4: Only define DMRS 1+1 for NR 2-step RACH performance definition. |
| R4-2009739 Views on BS demodulation requirements for NR 2-Step RACH | Intel | Proposal #1: Consider Post FFT time offset compensation as a baseline receive processing for requirements definition (i.e. No per UE FFT window adjustment).  Proposal #2: Specify MsgA demodulation performance requirements only with medium level TO set.  Proposal #3: Specify MsgA demodulation performance requirements with 1+1 DMRS configuration.  Proposal #4: During the test update TO error per each RACH preamble + MsgA occasion.  Proposal #5: Specify MsgA demodulation performance requirements with 1% BLER metric. |

# Topic #1: Setup for specifying BS demodulation requirements for 2-step RACH

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

## Companies’ contributions 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 1-1

*Sub-topic description: open issues on configurations*

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

**Issue 1-1: DMRS configuration**

* Proposals
  + Option 1: 1+1+1
  + Option 2: 1+1
* Recommended WF
  + Option 1?

**Issue 1-2: Mapping type**

* Proposals
  + Option 1: both mapping type A and B for both FR1 and FR2
  + Option 2: mapping type A for FR1, and mapping type B for FR2
* Recommended WF
  + Option 1?

**Issue 1-3: TO compensation**

* Proposals
  + Option 1: with TO compensation
  + Option 2: without TO compensation
* Recommended WF
  + Option 1?

**Issue 1-4: Starting value for medium level TO cycling**

* Proposals
  + Option 1: set 0 µs as starting value for SCSs for medium level TO cycling
  + Option 2: keep current starting values
* Recommended WF
  + Option 1?

**Issue 1-5: Should maximum value for TO cycling be larger than CP?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + Option 1?

**Issue 1-6: Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120k**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + Option 1?

**Issue 1-7: Test metric**

* Proposals
  + Option 1: BLER = 0.1
  + Option 2: BLER = 0.01
* Recommended WF
  + Option 1?

**Issue 1-8: MCS**

* Proposals
  + Option 1: keep current agreement MCS 1 for FR1 and MCS 3 for FR2
  + Option 2: set MCS 0 for both FR1 and FR2
* Recommended WF
  + Option 1?

**Issue 1-9: Combination of number of PRBs and number of symbols**

* Proposals
  + Option 1: keep current agreement (2 PRBs, 14 symbols) for FR1, and (2 PRBs, 10 symbols) for FR2
  + Option 2: (4 PRBs,7 symbols) for FR1 and (4 PRBs, 5 symbols) for FR2.
* Recommended WF
  + Option 1?

**Issue 1-10: Should requirements for both medium and high level TO cycling be defined?**

* Proposals
  + Option 1: Yes, keep current agreement
  + Option 2: No, only define requirement for high level TO cycling
  + Option 3: No, only define requirements for medium level TO cycling
* Recommended WF
  + Option 1?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |

### 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** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations 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 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 (if applicable)

## 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: Declaration and test aspects

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

## Companies’ contributions 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

*Sub-topic description: Declaration item(s) for BS demodulation for 2-step RACH*

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

**Issue 2-1-1: Should be the support of medium or high level TO cycling declared?**

* Proposals
  + Option 1: Yes, either support of medium or high level TO cycling should be declared
  + Option 2: Yes, only the support of high level TO cycling should be declared. Support of medium level TO cycling is mandatory
  + Option 3: Yes, only the support of medium level TO cycling should be declared. Support of high level TO cycling is mandatory
  + Option 4: No, both medium and high level TO cycling should be mandatory
* Recommended WF
  + Option 1?

### Sub-topic 2-2

*Sub-topic description: test aspects for BS demodulation for 2-step RACH*

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

**Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* Recommended WF
  + Option 1?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  ….  Others: |

### 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** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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| --- | --- | --- |
|  | **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** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## 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 #3: CRs

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

## Companies’ contributions 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 3-1

*Sub-topic description: CR for TS 38.104*

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

**Issue 3-1: Add a new section 8.2.6 to capture the requirements of BS demodulation for 2-step RACH in TS 38.104**

* Proposals
  + Option 1: Yes
  + Option 2: Other options not precluded
* Recommended WF
  + Option 1?

### Sub-topic 3-2

*Sub-topic description: CR for TS 38.141-1*

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

**Issue 3-2: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-1**

* Proposals
  + Option 1: Yes
  + Option 2: Other options not precluded
* Recommended WF
  + Option 1?

### Sub-topic 3-3

*Sub-topic description: CR for TS 38.141-2*

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

**Issue 3-3: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-2**

* Proposals
  + Option 1: Yes
  + Option 2: Other options not precluded
* Recommended WF
  + Option 1?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 3-1:  ….  Others: |

### 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** |
| R4-2010784 Draft CR for 38.104 | 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** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*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** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## 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 #4: Simulation results

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

## Companies’ contributions 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.*

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | ….  Others: |

### 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** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*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** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## 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”* |