**3GPP TSG-RAN WG4 Meeting # 99-e R4-210XXXX**

**Electronic Meeting, 19th – 27th May, 2021**

**Agenda item:** 6.2.4.3

**Source:** Moderator (Intel Corporation)

**Title:** Email discussion summary for [99-e][324] V2X\_Demod\_Part2

**Document for:** Information

# Introduction

The scope of this email thread is Rel-16 V2X multi-link performance requirements.

Email discussion targets for the 1st round and 2nd round

* 1st round:
  + Discussion on remaining open issues
  + Collection of comments for Draft CRs
* 2nd round:
  + Collection of comments for Updated Draft CRs.

# Topic #1: V2X multi-link performance requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109197 | Intel Corporation | Summary of NR V2X multiple link simulation results |
| R4-2109567 | Qualcomm, Inc. | **Proposal 1:** Use the following procedure to test PSFCH capability:   1. In every slot, TE transmits one of the following two options (1) all ACK (2) one NACK and all the rests are ACK 2. UE decodes all the PSFCH to decide PSSCH ReTx. For (1), no ReTx; for (2), ReTx 3. TE can verify whether UE successfully detect all the PSFCH by ReTx is received or not. If UE ReTx behavior is correct, this slot is a “successful slot”. The requirement can be defined by “successful slot” exceeding 90%/99% or higher.   **Proposal 2:** Specify RV = {0,2} in HARQ combining test.  **Observation 1:** Large separation (>10dB) is observed between first and second transmission for selected MCS. UE still has to use the HARQ buffer for combining when SNR is slightly larger than the 5% requirement.  **Proposal 3:** Larger margin can be added to impairment results if large deviation is observed in HARQ buffer combining test. |
| R4-2109046 | CATT, GOHIGH | Simulation results of NR V2X multiple link demodulation tests  **Power imbalance test**  **Observation:** In previous meetings, there are companies submiting SINR results while the figure indicates SNR v.s. BLER rather than SINR v.s. BLER. In order to avoid confusion, it is expected to align the horizontal-axis variable in the figures from companies as SINR2 instead of SNR2. |
| R4-2110520 | Huawei, HiSilicon | Simulation results on NR V2X power imbalance test |
| R4-2110521 | Huawei, HiSilicon | Rel-16 Draft CR for 38.101-4 with following changes for power imbalance test:   * Remove the square bracket |
| R4-2109195 | Intel Corporation | Simulation results for HARQ soft buffer combing requirements |
| R4-2109566 | Qualcomm, Inc. | Rel-16 Draft CR for 38.101-4 on HARQ buffer soft combining test cases |
| R4-2110522 | Huawei, HiSilicon | Simulation results on NR V2X soft buffer test |
| R4-2109196 | Intel Corporation | **Observation #1:** New methodology does not guaranty that UE makes detection of all PSFCHs for each slot with one NACK and multiple ACKs.  **Observation #2:** There are no clear benefits of Option 2 in comparison with Option 1 for PSFCH decoding capability test in terms of test cost and test configuration complexity.  **Observation #3:** There are no clear benefits of Option 2 in comparison with Option 1 for PSCCH decoding capability test in terms of test cost and test configuration complexity.  **Proposal 1:** Keep the following previous meeting agreement on test setup and test method for PSFCH decoding capability requirements:   * TE randomly transmit ACK or DTX on each PSFCH resource with equal probability * AT command adopted for this test case based on current available solution. |
| R4-2109719 | LG Electronics Inc. | **Proposal 1:** Option 1 is the simple and accurate method for PSFCH decoding capability and PSCCH decoding capability test.  **Proposal 2:** Option 2 could be applied to the PSFCH decoding capability test for consistency with other demodulation tests.  **Proposal 3:** Transmission type for PSFCH resources for option 2 could be (1)all ACK, (2) one NACK+ACK for all remaining, and (3) one DTX+ACK for all remaining, and these three types are transmitted with equal probability.  **Proposal 4:** For test metric of option 2, ‘PSFCH slot success rate (%)’ could be used with 99% for target value. |
| R4-2110523 | Huawei, HiSilicon | **Proposal 1:** Use Option 2 for PSFCH decoding capability test.  **Proposal 2:** Minimum requirements can be defined that the ratio of PSSCH retransmission shall not exceed 1% |
| R4-2110524 | Huawei, HiSilicon | **Proposal 1:** Use Option 2 for this test. |

## Open issues summary

### Sub-topic 1-1: Power imbalance test

**Issue 1-1-1: Finalization of Power imbalance requirements**

* Recommended WF
  + Define requirements based on updated results captured in R4-2109197

### Sub-topic 1-2: HARQ soft buffer combing test

**Issue 1-2-1: RV sequence**

* Proposals
  + Option 1 (QC): Specify RV = {0,2} in HARQ combining test
* Recommended WF
  + Check companies views on Option 1

**Issue 1-2-2: Finalization of HARQ soft buffer combing requirements**

* Proposals
  + Option 1 (QC): Larger margin can be added to impairment results if large deviation is observed in HARQ buffer combining test.
* Recommended WF
  + Define requirements based on updated results captured in R4-2109197
  + Further discuss whether Option 1 should be considered based on results

### Sub-topic 1-3: PSFCH decoding capability test

**Issue 1-3-1: Test setup and test method**

* Background
  + Option 1 (Baseline solution, GTW #98-bis-e agreement)
    - TE randomly transmit ACK or DTX on each PSFCH resource with equal probability
    - AT command adopted for this test case based on current available solution.
  + Option 2 (new option)
    - In every slot, TE transmits one of the two following options (1) all ACK (2) one NACK and all the rests are ACK
    - UE decodes all the PSFCH to decide PSSCH ReTx. For (1) no reTx; for (2) ReTx
    - Test metric: TE can verify whether UE successfully detect all the PSFCH by reTx received or not. If UE reTx behavior is correct, this slot is a “successful slot”. The requirement can be defined by “successful slot” exceeding 90%/99% or higher.
* Proposals
  + Option 1 (Intel, LGE?): Keep Option 1
  + Option 2 (QC): Use Option 2
    - Option 2a (LGE): Use Option 2 with the following modification:
      * Transmission type for PSFCH resources could be (1)all ACK, (2) one NACK+ACK for all remaining, and (3) one DTX+ACK for all remaining, and these three types are transmitted with equal probability.
      * Test metric: ‘PSFCH slot success rate (%)’ could be used with 99% for target value.
    - Option 2b (HW, QC): Option 2 with test metric: ratio of PSSCH retransmission shall not exceed 1%
* Recommended WF
  + Collect detailed comments from other companies with pros and cons of each option

### Sub-topic 1-4: PSFCH decoding capability test

**Issue 1-4-1: CBW and feedback configuration**

* Background
  + GTW #98-bis-e agreement: Option 1 (no PSFCH, AT command and 40 MHz) adopted with the consideration that AT command need to be used for some other test case(s).
  + Option 2 (will be considered only if no AT command PSFCH capability test is agreed): 40 MHz CBW, PSFCH based feedback and following test methodology
    - TE sets PSSCH priority (in PSCCH) when PSFCH Tx capability < 10, x PSSCH with higher priority, 10-x PSSCH with lower priority. Note that PSFCH is selected according to PSSCH priority, hence if PSFCH Tx capability = x, the x feedback corresponding to x high priority PSSCH is transmitted to TE.
    - TE can verify UE PSCCH decoding success or failure by checking whether all the higher priority PSSCH feedback is received. In order to always feedback all the high priority SCHs, UE has to decode all CCH to know the priority.
    - To avoid UE cheating, TE can randomize the location of higher priority PSSCHs
* Proposals
  + Option 1
  + Option 2 (HW, QC)
* Recommended WF
  + Wait outcome of discussion on Issue 1-3-1.
  + Based on previous meeting agreement
    - If Option 1 will be agreed for Issue 1-3-1 then Option 1 will be used for Issue 1-4-1
    - If Option 2 will be agreed for Issue 1-3-1 then Option 2 will be used for Issue 1-4-1

## Companies views’ collection for 1st round

### Open issues

#### Sub-topic 1-2: HARQ soft buffer combing test

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-2-1: RV sequence** |

#### Sub-topic 1-3: PSFCH decoding capability test

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-3-1: Test setup and test method** |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2110521 | Company A |
| Company B |
|  |
| R4-2109566 | 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:* |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **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)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents