**3GPP TSG-RAN WG4 Meeting # 99-e R4-2108449**

**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

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| **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%
  + Option 2c: (QC, LGE, MTK, Huawei)
    - In every slot, TE transmits one of the two following options with equal probability: (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. Note that there are two options in (2), they are selected with equal probability when (2) is selected.
    - 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 99%.
  + Option 2d: (Huawei)
    - In every slot, TE randomly transmits one of three signal patterns: (1) all ACK (50% probability). (2a) one NACK and all the rests are ACK (25 % probability). (2b) one DTX and all the rests are ACK (25% probability).
    - Three test metrics to be defined:
      * For slots with all ACKs transmitted: :
        + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%
      * For slots with one NACK and ACK for all rest transmitted:
        + Number of PSSCH retransmissions / Total number of slots with one NACK and ACK for all rest transmitted >= 99.9%
      * For slots with one DTX and ACK for all rest transmitted:
        + Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%
  + Option 2e (Intel)
    - Generate slots with only ACKs with 50% probability and slots with one NACK or one DTX with 50% probability.
    - Two test metrics:
      * For slots with all ACKs transmitted:
        + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%
      * For slots with DTX+ACK and NACK+ACK:
        + Number of PSSCH retransmissions / Total number of slots with DTX+ACK and NACK+ACK transmitted >= 99%
  + Option 2f (Intel)
    - Generate slots with only ACKs with 50% probability and slots with one DTX with 50% probability.
    - Two test metrics:
      * For slots with all ACKs transmitted:
        + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%
      * For slots with one DTX and ACK for all rest transmitted:
        + Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%
* Recommended WF
  + Collect detailed comments from other companies with pros and cons of each option

### Sub-topic 1-4: PSCCH 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)
  + Option 2b (Intel): Change test metric for Option 2 to probability of successful slot
* 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

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| **Company** | **Comments** |
| XXX | **Issue 1-2-1: RV sequence** |
| Intel | **Issue 1-2-1: RV sequence**  Support Option 1. |

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

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| **Company** | **Comments** |
| XXX | **Issue 1-3-1: Test setup and test method** |
| Intel | **Issue 1-3-1: Test setup and test method**  We support Option 1 because:   1. For Option 2 we can not guaranty that UE always makes the detection of all PSFCH resources. For example, in slot with one NACK and multiple ACKs, once UE detects NACK it can stop further detection and just generate retransmission. 2. Test time for Option 2 will be higher in comparison to Option 1, because for Option 2 we have per slot statistics collection and for Option 1 we have per PSFCH resource statistics collection (number of PSFCH resources per slot is {5, 15, 25, 32, 35, 45, 50, 64} depending on UE capability). Based on our understanding, testing time has impact on test cost. Therefore, test cost for Option 2 can be higher than for Option 1. 3. Test setup for Option 1 is simpler in comparison to Option 2.   As for test setup consistence for all V2X test cases, we think that it will be fine that all decoding capability tests will be defined with using of AT command and the rest of test cases will be defined based on UE feedback. |
| QC | We support option 2. We address Intel’s comment and integrate option 2a and 2b by a new option explained below.  Towards Intel’s comment:   1. Note that half of the transmission is all ACK, the issue Intel mentioned only applies to the with NACK case. For with NACK case, we can randomize the location of NACK so that UE can’t always decode the NACK first. More importantly, in practice, when UE decodes a NACK or several NACKs with high confidence in groupcast, it can skip the rest of decoding to save power and reduce thermal. When AT command is used and all the PSFCH are counted, it actually prevents UE from adopting this smarter scheme in groupcast. 2. The target success rate is 99%, and one test point can be generated per slot. To achieve good reliability, at least 10^4 slots are required, which corresponds to 5 seconds testing time. We agree that testing time can be reduced with option 1, but 5 seconds is already short enough. Compared to additional time and cost for setting up AT command loop, 5 seconds is much shorter. Note that as we explained in our contribution, per slot statistics is actually better aligned to the definition of capability test.   New integrated option:  We agree with Huawei’s proposal of 1% error probability requirement. For LGE’s proposal, although we consider any mistakes between ACK/NACK/DTX are equivalent in capability test due to absence of noise, we are willing to incorporate LGE’s opinion of adding DTX into our option. Since reTx behavior is the same for NACK and DTX, we add DTX as a sub-option together with NACK.   * + - In every slot, TE transmits one of the two following options with equal probability: (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. Note that there are two options in (2), they are selected with equal probability when (2) is selected.     - 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 99%. |
| LG | Basically we think that both test methods as option1 and option2 are feasible. For consistency with other test cases, the option 2 is acceptable. For transmission type (3) of option 2a, it is for verifying UE behavior when DTX is configured. We are fine with QC’s new integrated option for (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. |
| Huawei | We prefer Option 2. Since this test is capability test without added noise, the UE can decode all the PSFCHs correctly of one slot if the UE has enough processes and the ratio “success slot” should be 100%. If UE don’t have the corresponding capability, the UE will always miss detection of some PSFCHs for each slot and the ratio of “success slot” will be 0. Therefore, we think the result of this test can be divided two values: “100% or 0%”.  Considering the result can be predicted to be 100% or 0%, the test time can shortened. For example, the test time can be set to 100 slots. If the UE has the capability, it will pass all the slots and fail all the slots otherwise.  To QC and Intel: We think the purpose of transmission of one NACK in random slot is preventing UE from cheating (UE can always not retransmit PSSCH) and the slot containing NACK shouldn’t be counted.  We propose the following test metric:   * For all the slots containing NACK, there should be reTx of PSSCH * For the slots with ACK only, the ratio of reTx PSSCH shouldn’t exceed 1%. |
| LG | Comment for option 2d  For clarification, is the suggestion to define two test metric based on ACK and NACK/DTX transmission types? Maybe we can single test metric as probability of successful slot with all ACK/one NACK/on DTX = 99%. |
| Intel | We also were thinking that introducing of two test metric will be also aligned with our previous agreement on test metrics for PSFCH decoding capability test: Pr(ACK miss)<1% and Pr(DTX to ACK)<1%. Test metric #1 is same as Pr(ACK miss) and Test metric #2 is same as Pr(DTX to ACK) + Pr(NACK to ACK). |
| Huawei | According to the agreement of GTW, Integrated option 2a aND option 2b as proposed by QC is selected as test setup for PSFCH decoding capability test. But specific test metrics need further discussion.  For test metric, we think it would be better to define three metrics for three kinds of signal patterns separately i.e. slots with all ACKs, slots with one NACK and slots with one DTX. Only passing the test metric for slots with NACK or DTX can’t fully verify UE PSFCH processing capability as UE declares. The reason is that if UE detects one NACK or DTX, it can skip detecting all the rest PSFCHs under the group cast scenario with ACK-NACK mode and we can’t judge if the tested UE decode all the PSFCHs if we receive the retransmission.  From our understanding, the purpose of transmitting NACK or DTX in some random slots is to prevent UE from cheating (i.e. Verify the UE’s behavior that UE should detect all PSFCHs in all slots and not retransmit PSSCH for all the slots without any possible detection). In other words, if UE has detected all the PSFCHs for these slots (i.e. UE is not cheating), then it should pass the test metric designed for these kind of slots. The only possible error that UE is not cheating but fail these slots is UE detect NACK or DTX as ACK. In performance test, the requirement for Prob(NACK->ACK) is defined as 0.1% and Prob(DTX->ACK) is defined as 1%. Therefore, we propose to define the following test metrics for three types of slots:   * For slots with all ACKs transmitted: :   + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1% * For slots with one NACK and ACK for all rest transmitted:   + Number of PSSCH retransmissions / Total number of slots with one NACK and ACK for all rest transmitted >= 99.9% * For slots with one DTX and ACK for all rest transmitted:   + Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%   We list all the possible behaviours of UE as following:   1. If a UE doesn't have the PSFCH decoding capability, i.e. UE can’t decode all the PSFCHs in one slot, it will fail the metric for slots with all ACKs 2. If a UE is cheating, i.e. UE doesn’t retransmit PSSCH for all the slots, it will fail the metric for slots with one NACK and one DTX. |
| QC | We support Huawei’s proposal, and we believe it successfully address the concern raised by Intel. UE is required to detect all the ACK in the all ACK slots to make correct decision not to retransmit PSSCH, unless UE blindly not retransmitting PSSCH. If UE blindly skips PSSCH retransmission, UE fails the NACK and ACK/ DTX and ACK slots requirement. Therefore, we support this proposal.  We suggest keeping the transmission probability as the original proposal:   * + - In every slot, TE transmits one of the two following options with equal probability: (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. Note that there are two options in (2), they are selected with equal probability when (2) is selected.   But we are open to discuss the transmission probability. |
| QC | We checked Intel’s proposal again, it is quite similar to Huawei’s proposal, the only difference we observe is the requirement for NACK+ACK slot: 1% or 0.1%? We are fine for both. |
| Intel | @QC: The only difference is whether to have three or two test metrics.  Another thought:  The following test metrics were agreed for Pr(ACK miss) and Pr(DTX to ACK) for PSFCH decoding capability test. Taking into account that for slots with one DTX or one NACK the UE feedback is same (i.e. retransmission of PSSCH) and the main purpose of these slots is same, i.e. verification that UE makes the detection of PSFCH candidates, we can keep only two type of slots (1) all ACK and (2) one DTX and two test metrics suggested by HW.  The current concern from our side to consider three test metrics proposed by HW, is that we need more time to collect sufficient statics for slots with one NACK (due to higher requirement metric) in comparison to statistics for other slots. Taking into account that during the test different types of slots will be randomly generated, test time will be significantly increased due to waiting of collection of sufficient statistics for slots with one NACK.  Based on that we have two options in mind:   * Option 1: Generate slots with only ACKs with 50% probability and slots with one NACK or one DTX with 50% probability. Two test metrics:   + For slots with all ACKs transmitted:     - Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%   + For slots with DTX+ACK and NACK+ACK:     - Number of PSSCH retransmissions / Total number of slots with DTX+ACK and NACK+ACK transmitted >= 99% * Option 2: Generate slots with only ACKs with 50% probability and slots with one DTX with 50% probability. Two test metrics:   + For slots with all ACKs transmitted:     - Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%   + For slots with one DTX and ACK for all rest transmitted:     - Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%   For both options the time required for collection of sufficient statics for two test metrics is same.  Both options are fine for us. Option 2 is slightly preferred. |

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

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| **Company** | **Comments** |
| Intel | **Issue 1-4-1: CBW and feedback configuration**  We suggest also to use probability of successful slot as test metric to have consistency with PSFCH decoding capability test (i.e. similar approach with maximum capability tests) and to avoid different test duration for UE with different PSFCH Tx capabilities. |
| LG | **Issue 1-4-1: CBW and feedback configuration**  We are fine with the suggestion |
| QC | **Issue 1-4-1: CBW and feedback configuration**  We are fine with the suggestion |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2110521 | Intel:   1. Taking into account that CR only affects Section 11.1.6, suggest to keep only this section to simplify review and implementation of this draft CR 2. SNR point will be updated based on new results from companies for this meeting 3. Suggestion for editorial change: Align wording for Note 2 and 3. For example, we can change Note 3 as: Frequency offset of received signal by Sidelink UE with respect to GNSS reference frequency. |
| Company B |
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| R4-2109566 | Intel:   1. Suggest to use the following methodology for CR drafting: copy content from the latest endorsed Big Draft CR without track changes and use track changes for the suggested updates. Such procedure will allow to clearly see the changes in comparison for endorsed Draft CR. 2. SNR point will be updated based on new results from companies for this meeting 3. Remove [] for all parameters in Table 11.1.7.1.1-1 4. Suggestion for editorial change: Align wording for Note 4 and 5. For example, we can change Note 5 as: Frequency offset of Sidelink UE receive signal is with respect to GNSS reference frequency. |
| Company B |
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## Summary for 1st round

### Open issues

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

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|  | **Status summary** |
| **Issue 1-2-1: RV sequence** | *GTW agreements: Option 1*.  *Candidate options: N/A*  *Recommendations for 2nd round: N/A* |

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

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|  | **Status summary** |
| **Issue 1-3-1: Test setup and test method** | *GTW agreements:*  Option 2C: (QC, LGE, MTK, Huawei)   * In every slot, TE transmits one of the two following options with equal probability: (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. Note that there are two options in (2), they are selected with equal probability when (2) is selected. * 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 99%.   Option 2C , Further confirm test metric  *Candidate options:*   * Option 2c:   + In every slot, TE transmits one of the two following options with equal probability: (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. Note that there are two options in (2), they are selected with equal probability when (2) is selected.   + 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 99%. * Option 2d   + In every slot, TE randomly transmits one of three signal patterns: (1) all ACK (50% probability). (2a) one NACK and all the rests are ACK (25 % probability). (2b) one DTX and all the rests are ACK (25% probability).   + Three test metrics to be defined:     - For slots with all ACKs transmitted: :       * Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%     - For slots with one NACK and ACK for all rest transmitted:       * Number of PSSCH retransmissions / Total number of slots with one NACK and ACK for all rest transmitted >= 99.9%     - For slots with one DTX and ACK for all rest transmitted:       * Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99% * Option 2e   + Generate slots with only ACKs with 50% probability and slots with one NACK or one DTX with 50% probability.   + Two test metrics:     - For slots with all ACKs transmitted:       * Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%     - For slots with DTX+ACK and NACK+ACK:       * Number of PSSCH retransmissions / Total number of slots with DTX+ACK and NACK+ACK transmitted >= 99% * Option 2f   + Generate slots with only ACKs with 50% probability and slots with one DTX with 50% probability.   + Two test metrics:     - For slots with all ACKs transmitted:       * Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%     - For slots with one DTX and ACK for all rest transmitted:       * Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%   *Recommendations for 2nd round: Choose one of the options 2c, 2d, 2e or 2f* |

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

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|  | **Status summary** |
| **Issue 1-4-1: CBW and feedback configuration** | *GTW agreements: Option 2 based on 1-3-1 agreements*  *Candidate options:*   * *Option 2a: Test metric is probability of successful PSCCH resource* * *Option 2b: Test metric is probability of successful slot*   *Recommendations for 2nd round: Choose one of the options 2a or 2b* |

### CRs/TPs

## Discussion on 2nd round

### Open issues

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

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

* Proposals
  + Option 2c
    - In every slot, TE transmits one of the two following options with equal probability: (1) all ACK (2) a. one NACK and all the rest are ACK b. one DTX and all the rest are ACK. Note that there are two options in (2), they are selected with equal probability when (2) is selected.
    - 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 99%.
  + Option 2d (Huawei, QC)
    - In every slot, TE randomly transmits one of three signal patterns: (1) all ACK (50% probability). (2a) one NACK and all the rests are ACK (25 % probability). (2b) one DTX and all the rests are ACK (25% probability).
    - Three test metrics to be defined:
      * For slots with all ACKs transmitted:
        + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%
      * For slots with one NACK and ACK for all rest transmitted:
        + Number of PSSCH retransmissions / Total number of slots with one NACK and ACK for all rest transmitted >= 99.9%
      * For slots with one DTX and ACK for all rest transmitted:
        + Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%
  + Option 2e (Intel)
    - Generate slots with only ACKs with 50% probability and slots with one NACK or one DTX with 50% probability.
    - Two test metrics:
      * For slots with all ACKs transmitted:
        + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%
      * For slots with DTX+ACK and NACK+ACK:
        + Number of PSSCH retransmissions / Total number of slots with DTX+ACK and NACK+ACK transmitted >= 99%
  + Option 2f (Intel)
    - Generate slots with only ACKs with 50% probability and slots with one DTX with 50% probability.
    - Two test metrics:
      * For slots with all ACKs transmitted:
        + Number of PSSCH retransmissions / Total number of slots with all ACKs transmitted <= 1%
      * For slots with one DTX and ACK for all rest transmitted:
        + Number of PSSCH retransmissions / Total number of slots with one DTX and ACK for all rest transmitted >= 99%

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| **Company** | **Comments** |
| XXX |  |

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

**Issue 1-4-2: Test metric**

* Proposals
  + Option 2a: Test metric is probability of successful PSCCH resource
  + Option 2b (Intel, LG, QC): Test metric is probability of successful slot

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2108532 (revision of R4-2110521) | Company A |
| Company B |
|  |
| R4-2108533 (revision of R4-2109566) | Company A |
| Company B |
|  |
| R4-2108534 | Company A |
| Company B |
|  |
| R4-2108535 | Company A |
| Company B |
|  |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| Draft CR for 38.101-4: Introduction of PSFCH decoding capability test for NR V2X. | Huawei, HiSilicon | Capture agreements of test setup change |
| Draft CR for 38.101-4: Introduction of PSCCH decoding capability test for NR V2X. | Huawei, HiSilicon | Capture agreements of test setup change |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2110521 | Draft CR: Introduction of NR V2X power imbalance test | Huawei, HiSilicon | Revised |  |
| R4-2109566 | Draft CR: Demod HARQ buffer soft combining test cases for NR V2X | Qualcomm Incorporated | Revised |  |

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