**3GPP TSG-RAN WG4 Meeting #98-e R4-21xxxxx**

**Electronic Meeting, 25 Jan - 5 Feb, 2021**

**Agenda item:** 7.16

**Source:** Moderator (China Telecom)

**Title:** Email discussion summary for [98e][326] NR\_perf\_enh\_Demod

**Document for:** Information

# Introduction

This email thread discusses the NR Rel-16 demodulation performance requirements in agenda 7.16. Note that no tdoc has been submitted for BS demodulation in agenda 7.16.2 in this meeting.

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

* 1st round: Invite companies to review the recommended WF in section 1~5, and provide comments (if any) in section 1.3, 2.3, 3.3, 4.3 and 5.3.
* 2nd round: TBA

# Topic #1: Release independent aspect

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2100787 | China Telecom | CR for TS 38.307 on UE demodulation performance requirements (Rel-15) |
| R4-2100788 | China Telecom | CR for TS 38.307 on UE demodulation performance requirements (Rel-16) |
| R4-2100789 | China Telecom | CR for TS 38.307 on UE demodulation performance requirements (Rel-17) |

## Open issues summary

*No open issue.*

## Companies views’ collection for 1st round

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2100787, Rel-15 38.307 CR, Cat. B, CTC | Company A: |
| Company B: |
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| R4-2100788, Rel-16 38.307 CR, Cat. B, CTC | docomo: In terms of the NOTE 1 in Table B.3.2-1 and Table B.3.2-2, we probably need to change Section 9.1.1.1 to Section 9.1.1.  ZTE: Perhaps a more generic feature “Precoding matrix indicator (PMI) reporting requirements including Type I and Type II codebook” with a description of supporting up to 32Tx could be another option. In this way, the number of total Tx can be changed in different future release, while keeping the feature name unchanged, a similar way as other release-independence features in TS 38.307. |
| Ericsson: In Table B.3.1-1, the section/clause numbering need to be changed according to the conclusion of Issue 2-1.  In Table B.3.1-1, the description of 7.2A.2 is ‘PDSCH 2RX demodulation requirements for NR FR2 CA configurations with FDL\_high not exceeding 40000 MHz’. Since RAN4 is discussing the UE demodulation requirements for 47GHz (n262), we propose to remove ‘with FDL\_high not exceeding 40000MHz’ to avoid the maintenance work in the future. |
| ZTE: Similar comments as above. |
| R4-2100789, Rel-17 38.307 CR, Cat. A, CTC (Not uploaded yet) | Company A: |
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Note: To save time on typing the comments one by one, companies can also directly revise the draft CR and upload the revision in the draft inbox.

## 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.*

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|  | **Status summary** |
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*Recommendations on WF/LS assignment*

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

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

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| **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

## Summary on 2nd round

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

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| **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”* |
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# Topic #2: UE CA PDSCH requirements

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2100786 | China Telecom | Proposal 1: Use option 1 for the antenna connection for FR1 CA tests with 4 RX.  Observation 1: The agreed procedure for selecting CA configuration(s) and CBW combination can be used to find the test scenario where UE support at least 2 layer on each CC. |
| R4-2100816 | CMCC | CR for NR PDSCH FR1 CA 2Rx performance requirements |
| R4-2100822 | CMCC | Issue1: Antenna connection for CA tests with 4 RX  Proposal 1: We support to reuse the same antenna connection for CA tests with 4RX in LTE   * + If any of the Pcell and/or the Scells is a 4 RX supported RF band, all 4 RX should be connected with data source from system simulator.   + If any of the Pcell and/or the Scells is a 2 RX supported RF band, 2 out of the 4 RX should be connected with data source from system simulator, and the other 2 RX are connected with zero input.   Issue2: How to test the UE which does not support 2-layer transmission on all CCs for all supported CA configurations.  In our point of view, the case that UE does not support 2-layer transmission on all CCs for all supported CA configurations is a conner case, no further discussion is needed in this stage. |
| R4-2101254 | Intel Corporation | Proposal 1: Reuse LTE applicability rule and antenna connection approach defined in 8.1.2.6.5 of 36.101 for NR CA testing of 4 Rx capable Ues.  Proposal 2: Add the following clarification to NR CA applicability rules: “Verify Ues only on CCs, for which the supported maximum number of MIMO layers is not lower than 2. OCNG pattern is used for CCs, for which the supported maximum number of MIMO layers is 1, and performance is not verified on these CCs”. |
| R4-2101255 | Intel Corporation | CR on applicability rules for Normal NR CA requirements |
| R4-2101365 | Huawei, HiSilicon | Proposal 1: Reuse the test applicability rule defined for single carrier for CA tests with 2Rx and 4Rx, i.e.   * + Only conducted CA tests with 2Rx for UE only supports 2Rx   + Only conducted CA tests with 4Rx for UE only supports 4Rx   + Only conducted CA tests with 4Rx for UE supports both 2Rx and 4Rx   + Not conducted CA test with 4Rx for UE only supports 2Rx * Proposal 2: No further discussion on how to test UE that does not support 2-layer transmission on all CCs for all supported CA configurations is needed. |
| R4-2101434 | Ericsson | Draft CR: Section numbering for PDSCH CA demodulation requirements  It is important that the clause numberings are aligned between RAN5 conformance test specification and RAN4 specification at least on top test case title level. Also RAN5 test cases are common for 2Rx and 4Rx.  However the current RAN4 PDSCH CA requirement specification structure is not aligned with other requirements, that is, the PDSCH CA requrements and power imbalance requirements are inside the 2Rx and 4Rx sections.  For efficient RAN5 operation maintaining the clause number alignment, it is desirable that the 2Rx/4Rx requirements are added in the lowest clause number level, and any new features are added independently on the antenna number in a separate clause. |
| R4-2102818 | Qualcomm Incorporated | Proposal 1: Implement clause restructure of the CA PDSCH Demodulation and CA CQI reporting test cases in 38.101-4 spec as per option 1. If option 1 is not possible due to TS drafting rules, implement option 2.  Option 1:  5.2A                   PDSCH Demodulation requirements for CA  5.2A.1                Minimum requirements (normal PDSCH)  5.2A.1.1            1RX requirements (Void)  5.2A.1.2            2RX requirements  5.2A.1.3            4RX requirements  5.2A.2                Minimum requirements for carrier aggregation with power imbalance  5.2A.2.1            1RX requirements (Void)  5.2A.2.2            2RX requirements  5.2A.2.3            4RX requirements  Option 2:  If option 1 is not possible due to TS drafting rules, this could be another option  5.2A                   PDSCH Demodulation requirements for CA  5.2A.1                Void  5.2A.2                Void  5.2A.3                Void  5.2A.4                Minimum requirements (normal PDSCH)  5.2A.4.1            1RX requirements (Void)  5.2A.4.2            2RX requirements  5.2A.4.3            4RX requirements  5.2A.5                Minimum requirements for carrier aggregation with power imbalance  5.2A.5.1            1RX requirements (Void)  5.2A.5.2            2RX requirements  5.2A.5.3            4RX requirements |

## Open issues summary

### Sub-topic 2-1: Specification section numbering

**Issue 2-1: Section numbering for PDSCH CA demodulation requirements**

* Current section numbering:

5.2A PDSCH Demodulation requirements for CA

5.2A.1 1RX requirements (Void)

5.2A.2 2RX requirements

5.2A.2.1 Minimum requirements (normal PDSCH)

5.2A.2.2 Minimum requirements for carrier aggregation with power imbalance

5.2A.3 4RX requirements

5.2A.3.1 Minimum requirements (normal PDSCH)

5.2A.3.2 Minimum requirements for carrier aggregation with power imbalance

7.2A PDSCH Demodulation requirements for CA

7.2A.1 1RX requirements (Void)

7.2A.2 2RX requirements

7.2A.2.1 Minimum requirements (normal PDSCH)

* Issues with the current section numbering (E///, QC)
  + It is important that the clause numberings are aligned between RAN5 conformance test specification and RAN4 specification at least on top test case title level. Also RAN5 test cases are common for 2Rx and 4Rx.
  + However the current RAN4 PDSCH CA requirement specification structure is not aligned with other requirements, that is, the PDSCH CA requrements and power imbalance requirements are inside the 2Rx and 4Rx sections.
  + For efficient RAN5 operation maintaining the clause number alignment, it is desirable that the 2Rx/4Rx requirements are added in the lowest clause number level, and any new features are added independently on the antenna number in a separate clause.
* Proposals
  + Option 1 (E///, QC)

5.2A PDSCH Demodulation requirements for CA

5.2A.1 Void

5.2A.2 Void

5.2A.3 Void

5.2A.4 Minimum requirements

5.2A.4.1 1RX requirements (Void)

5.2A.4.2 2RX requirements

5.2A.4.3 4RX requirements

5.2A.5 Minimum requirements for carrier aggregation with power imbalance

5.2A.5.1 1RX requirements (Void)

5.2A.5.2 2RX requirements

5.2A.5.3 4RX requirements

7.2A PDSCH Demodulation requirements for CA

7.2A.1 Void

7.2A.2 Void

7.2A.3 Minimum requirements

7.2A.3.1 1RX requirements (Void)

7.2A.3.2 2RX requirements

* + Option 2 (if allowed by TS drafting rules):

5.2A                   PDSCH Demodulation requirements for CA

5.2A.1                Minimum requirements (normal PDSCH)

5.2A.1.1            1RX requirements (Void)

5.2A.1.2            2RX requirements

5.2A.1.3            4RX requirements

5.2A.2                Minimum requirements for carrier aggregation with power imbalance

5.2A.2.1            1RX requirements (Void)

5.2A.2.2            2RX requirements

5.2A.2.3            4RX requirements

* Recommended WF
  + Encourage feedback from more companies.
  + If the proposed option 1 or option 2 is agreeable, suggest to prepare formal CR in this RAN4 meeting, to facilitate the RAN5 work in RAN5 #90e meeting. In addition, the section numbering for CA CQI needs to be updated accordingly.

### Sub-topic 2-2: PDSCH CA test applicability

**Issue 2-2-1: Antenna connection for CA tests with 4 RX**

* *Agreement in RAN4 #97e (R4-2017561, WF)*
  + *Option 1:*
    - *If any of the Pcell and/or the Scells is a 4 RX supported RF band, all 4 RX should be connected with data source from system simulator.*
    - *If any of the Pcell and/or the Scells is a 2 RX supported RF band, 2 out of the 4 RX should be connected with data source from system simulator, and the other 2 RX are connected with zero input.*
  + *Other options are not precluded*
* Proposals
  + Option 1, i.e., reuse the same antenna connection for CA tests with 4RX in LTE (CTC, CMCC, Intel)
    - CTC: With option 1, the antenna connections for different scenarios (including all bands with 2RX, all bands with 4RX, 2RX bands + 4RX bands) are clear.
    - Intel: Two types of 4 Rx capable Ues may exist in the field: Type 1 (Ues only support 2Rx in certain bands and support 4Rx in the other bands) and Type 2 (Ues support 4Rx in all the bands). For Type 1 4 Rx capable Ues, test can be applied for CA configuration with mix of 2 and 4 Rx support.
  + Option 2: Reuse the test applicability rule defined for single carrier for CA tests with 2Rx and 4Rx, i.e. (HW)
    - Only conducted CA tests with 2Rx for UE only supports 2Rx
    - Only conducted CA tests with 4Rx for UE only supports 4Rx
    - Only conducted CA tests with 4Rx for UE supports both 2Rx and 4Rx
    - Not conducted CA test with 4Rx for UE only supports 2Rx
* Recommended WF
  + The main difference is on how to test UE supporting 2Rx in certain bands and supporting 4Rx in the other bands.
  + Considering the majority companies’ view, can we go with option 1?

**Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs**

* Proposals
  + Option 1: No further discussion is needed (CTC, CMCC, HW)
    - CTC: The agreed procedure for selecting CA configuration(s) and CBW combination can be used to find the test scenario where UE support at least 2 layer on each CC.
    - CMCC: the case that UE does not support 2-layer transmission on all CCs for all supported CA configurations is a conner case.
    - HW: Based on our understanding on the test applicability rule, for the selected CA configuration for test, only CCs supporting maximum number of MIMO layers not lower than 2 will be selected for tests, other CCs of the selected CA configuration not support maximum number of MIMO layers not lower than 2 will not be selected at all.
  + Option 2: Add the following clarification to NR CA applicability rules (Intel)
    - “Verify Ues only on CCs, for which the supported maximum number of MIMO layers is not lower than 2. OCNG pattern is used for CCs, for which the supported maximum number of MIMO layers is 1, and performance is not verified on these CCs”.
* Recommended WF
  + Can we go with option 1? Is the clarification in option 2 necessary?

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| Company A | Issue 2-1: Section numbering for PDSCH CA demodulation requirements  Issue 2-2-1: Antenna connection for CA tests with 4 RX  Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs |
| Company B | Issue 2-1: Section numbering for PDSCH CA demodulation requirements  Issue 2-2-1: Antenna connection for CA tests with 4 RX  Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs |
| CMCC | Issue 2-2-1: Antenna connection for CA tests with 4 RX  Support recommended WF to go with Option1  Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs  Support Option1 |
| China Telecom | Issue 2-1: Section numbering for PDSCH CA demodulation requirements  In our understanding, the motivation of the discussion is that: in the past, RAN5 always align their spec structure with 38.101-4. But this time, it is challenging for RAN5 to follow the current section numbering for PDSCH normal CA in 38.101-4, considering the Ues with different Rx antenna numbers (2Rx or 4Rx) in different bands.  Meanwhile, we have to say that re-number the section in RAN4 is a big change to the RAN4 spec, resulting in several sections and sub-sections with “Void”. So, we are neutral on this issue.  One point is that if it is agreeable to all companies in RAN4 to re-number the sections in 38.101-4, we should do it in this meeting but not in the future meeting, to minimize the impact due to potential cross-reference.  Issue 2-2-1: Antenna connection for CA tests with 4 RX  Option 1. CA test is different with single carrier test, for CA both 2Rx and 4Rx bands should be tested for Ues with 2RX bands + 4RX bands.  Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs  Option 1. The additional clarification in option 2 would not be needed, since the current test procedure is clear enough. |
| Intel | **Issue 2-1: Section numbering for PDSCH CA demodulation requirements**  Based on our understanding, Option 2 is not possible based on TS drafting rules. Therefore, we can go only with Option 1 in case it will be agreed to make such changes.  We think that proposed sections structure (i.e. Option 1) looks slightly better than existing one. Same time, such changes will lead to many “Void” in the TS. Therefore, we are fine with changes proposed in Option 1 or keep TS structure as it is.  **Issue 2-2-1: Antenna connection for CA tests with 4 RX**  Support Option 1.  Based on our understanding, in NR we have 4 RX bands for which 4 RX processing is mandatory and for which it is optional. Therefore, for some 4 Rx bands 4 RX processing is up to UE implementation. We can face the situation where scenario with mix of 2 Rx and 4 Rx processing will be selected for testing. We think that it is better to verify performance for hall scenarios (i.e. 2 Rx CCs + 4Rx CCs) rather than only 4 Rx CCs.  **Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs**  Option 1 is fine for us. Intention of our proposal (i.e. Option 2) was to resolve the issue raised in the previous meeting. However, in this meeting, interested companies are fine with existing methodology. Therefore, we don’t need any clarification. |
| Qualcomm | **Issue 2-1: Section numbering for PDSCH CA demodulation requirements**  We support Option 1 as discussed in our paper.  **Issue 2-2-1: Antenna connection for CA tests with 4 RX**  We have a few questions for clarification for Option 1:   1. When a UE supports 4Rx on one CC and 2Rx on another CC, then does this option mean that 4Rx will be connected for 1st CC and only 2Rx will be connected for 2nd CC? 2. When it says that “other 2Rx are connected with zero input”, does this mean that UE will actually receive zeros + some garbage noise and UE will process it or does this mean that UE will not receive anything on other 2Rx?   **Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs**  Ok with Option 1. |
| China Telecom 2 | **Issue 2-2-1: Antenna connection for CA tests with 4 RX**  Reply to QC:  To make it a little clearer, we copied the connection diagram from RAN5 LTE spec (TS 36.508) below (since the approach is reused from LTE CA normal PDSCH test):    Figure A.94: Connection Diagram to enable Carrier Aggregation tests (with 2x4 channel) on a 4Rx-capable UE with CCs on both 4Rx-supported RF bands and 2Rx-supported bands  (from RAN5 LTE spec TS 36.508) |
| Ericsson | **Issue 2-1: Section numbering for PDSCH CA demodulation requirements**  We support Option 1 as explained the motivation in Qualcomm paper and our CR.  Comments to China Telecom: our intension is to change the spec structure only for PDSCH CA part. We don’t see any issues for other requirements in TS38.101-4 V16.3.0. We don’t think it is a big change if you observe our draft CR R4-2101434. We agree we should fix it in this meeting to minimize the impact due to potential cross-reference.  **Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs**  We support Option 1. |
| ZTE | Issue 2-1: Section numbering for PDSCH CA demodulation requirements  We are fine with one option following TS drafting rules of these two options.  Issue 2-2-1: Antenna connection for CA tests with 4 RX  Option 1 with the clarification on the question raised by QC according to the above figure.  Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs  Ok for Option 1. |
| Huawei, HiSilicon | **Issue 2-1: Section numbering for PDSCH CA demodulation requirements**  Usually RAN5 should follow RAN4 specification structure, but now it is different. Actually from our point of view, we did not observe any issues for the current RAN4 existing section numbering by categorizing the performance requirements from the supported number of Rx antenna that is aligned with the original RAN4 agreement for the specification structure. Also like pointed out by other companies, many “Void” sections will be created that will make RAN4 specifications very ugly. We are not sure how much trouble will be brought to RAN5 work by following RAN4 current specification structure.  **Issue 2-2-1: Antenna connection for CA tests with 4 RX**  Here we would like to share some stories about LTE CA antenna connections: LTE demodulation performance requirements were defined based on 2Rx as baseline at first, in later release, RAN4 introduced performance requirements for 4Rx by a new WI, considering too heavy workload to define 4Rx related performance requirements for all scenarios considered for 2Rx, RAN4 agreed to define limited 4Rx performance requirements on top of 2Rx requirements, but UE supporting 4Rx should conduct the performance requirements defined for both 2Rx and 4Rx to ensure the test coverage. How to conduct those 2Rx related performance requirements for 4Rx capable UE is an issue, so related applicability rule and antenna connection are defined. But NR defined demodulation performance requirements with 4Rx as baseline in Rel-15, both 2Rx and 4Rx performance requirements are defined, performing separate 2Rx and 4Rx performance tests are enough to verify UE demodulation performance, it is not necessary to conduct the mixed 2Rx and 4Rx performance requirements considering the demodulation performance requirements are band agnostic,  **Issue 2-2-2: Applicability for Ues not supporting 2-layer transmission on all CCs**  Option 1. |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2100816, CMCC, FR1 CA 2Rx | Company A: |
| Company B: |
|  |
| R4-2101255, Intel, applicability rules | CMCC: Since the sub-clause 5.1.1.7.3 in CR “Applicability rule and antenna connection for **CA** tests with 4 RX” is for **CA** tests, we propose to modify the description like below:  Within the CA~~/DC~~ configuration if any of the PCell and/or the SCells/PSCell is a 2Rx supported RF band, 2 out of the 4Rx should be connected with data source from system simulator, and the other 2Rx are connected with zero input, depending on UE’s declaration and AP configuration. Requirements from Clause 5.2A.2.1 are applied.  Within the CA~~/DC~~ configuration if any of the PCell and/or the SCells is a 4Rx supported RF band, all 4Rx should be connected with data source from system simulator. Requirements from Clause5.2A.3.1 are applied. |
| China Telecom:  1) The added note to Table 5.1.1.7.2-1 and Table 7.1.1.5.2-1 is pending on the conclusion in Issue 2-2-2.  2) Agree with CMCC’s comment and “PSCell” needs also to be removed. |
| Intel: Thank you for comments. We are fine with suggested proposals. We will revise our CR after collection of comments from all interested companies in the first round. |
| Qualcomm: It may have to be modified based on outcome of Issue 2-2-1. |
| ZTE: Another sentence under the first two sub-clauses may be required to clarify the situation when both sub-clauses are met. |
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| R4-2101434, Ericsson, Draft CR: Section numbering for PDSCH CA | Company A: |
| Company B: |
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## 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.*

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|  | **Status summary** |
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*Suggestion on WF/LS assignment*

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

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

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| **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”* |
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## Discussion on 2nd round

## Summary on 2nd round

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

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| **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”* |
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# Topic #3: UE PMI reporting requirements with larger number of Tx ports

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2100216 | Apple | Proposal #1: Define PMI reporting requirements with Type II codebook at 90% Max TP. |
| R4-2100897 | Samsung | Wrong document submitted, revised to R4-2102939. |
| [R4-2100902](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100902.zip) | Samsung | Simulation results for Type II and Type I codebook based on the agreements in RAN4 #97e meeting.  Observation 1-MIMO Correlation: It is observed that the performance gain with Type II compared to Type I codebook in XP medium MIMO correlation is larger than in Custom Low correlation cases. Especially for 16x2 ‘Custom Low’, there is marginal gain for Type II codebook.  Observation 2-Test Metric: As shown in table 2.1~2.3, the TP ratios are reasonable and the SNR points are workable under the “following Type II PMI vs. random Type I PMI” test metrics.  Observation 3-Test point: The performance gap between following Type II and Type I is more obvious under 70% relative TP point than 90%, and 95% points.  Observation 4- Performance gap between Type II and Type (XP-Medium with 70% relative test point): 2.5dB around SNR gap for 2Rx cases, 1.5dB around SNR gap for 4Rx cases  Proposal 1: Introduce Type II codebook test cases   * SU-MIMO set-up * MIMO correlation: XP Medium MIMO correlation * Test metric: Relative TP between following Type-II/random PMI with Type I codebook * Test point: relative 70% TP with following PMI |
| [R4-2101317](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101317.zip) | Huawei, HiSilicon | Simulation results for Type II codebook PMI reporting test |
| [R4-2101318](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101318.zip) | Huawei, HiSilicon | Proposal 1: Use 95% maximum throughput to be the test point for eType II codebook |
| [R4-2101322](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101322.zip) | Huawei, HiSilicon | CR for 38.101-4: Applicability for NR PMI requirements with Tx ports larger than 8 and up to 32 |
| [R4-2101435](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101435.zip) | Ericsson | Simulation results. |
| [R4-2101436](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101436.zip) | Ericsson | Proposal: RAN4 revisit the metric of Rel-15 Type-II PMI reporting test to ensure the UE reporting Type-I cannot pass the tests, e.g., following Type-II PMI over following Type-I PMI. |
| [R4-2101437](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101437.zip) | Ericsson | CR |
| [R4-2102821](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102821.zip) | Qualcomm Incorporated | Proposal 1: Use 90% test point for defining Type II PMI reporting test cases.  Proposal 2: Use the test metric of throughput ratio between following Type II and random Type I for defining Type II PMI reporting tests and no need to check whether UE reported codebook is not only within Type I codebook set.  Proposal 3: Use XP Medium correlation for defining Type II PMI reporting tests. |
| R4-2102939 | Samsung | CR Introduction of PMI test cases with Rel-15 Type II codebook |

## Open issues summary

**Issue 3-1: Test metric for type II codebook**

* *Agreement in RAN4 #97e (R4-2017681, WF)*
  + *Test metric:* 
    - *Following PMI (Type II)/Random PMI (Type I codebook) (gamma values) based on the assumption that there are ensure enough performance difference over than Type I i.e., UE which employ Type I reporting will fail in the test case* 
      * *This test metric applied to UE which support Type II codebook feedback irrespective whether supporting Type I codebook feedback or not*
    - *FFS: Whether to check UE reported codebook not only within Type I codebook set*
* Proposals
  + Option 1: Following PMI (Type II)/Random PMI (Type I codebook) (gamma values) (Samsung, QC, [Apple], [HW])
    - Samsung: TP ratios are reasonable and the SNR points are workable under the “following Type II PMI vs. random Type I PMI” test metrics.
  + Option 2: Following Type-II PMI / following Type-I PMI (E///)
    - E///: There is less performance difference or almost no performance difference in terms of gamma value between the Type-I PMI reporting and Type-II PMI reporting.
* Recommended WF
  + Considering this is the last meeting for the WI, can we go with option 1 based on majority’s view? Any additional measure point to address E///’s concern?

**Issue 3-2: SNR point for type II codebook**

* *Agreement in RAN4 #97e (R4-2017681, WF)*
  + *Test point* 
    - *Option 1: 70%*
    - *Option 2: 90% (baseline)*
    - *Option 3: 95%*
    - *Other options not excluded*
* Proposals
  + Option 1: 70% (Samsung)
    - Samsung: Performance gap between following Type II and Type I is more obvious under 70% relative TP point than 90%, and 95% points.
  + Option 2: 90% (Apple, QC)
    - Apple: At 90% max TP, we have 3 dB gain in performance and considerable difference in TP gain. Using a lower test point like 80% or 70% max TP would result in larger delta between Type II and Type I results.
    - QC: Link adaptation algorithms try to keep the UE PDSCH BLER closer to 10%.
  + Option 3: 95% (HW)
    - HW: The ratio between Type II follow PMI and Type I random PMI on 70% and 90% of maximum throughput is too large to be set as a proper test metric.
* Recommended WF
  + 4 companies proposed 3 different options due to different observations from the simulation results.
    - In general, in all companies’ results, with higher percentage of TP point, smaller performance gap between following Type II and random Type I is observed; but the amount of the gap is quite different in different companies’ simulation results.
  + In the 1st round, encourage companies to double check the simulation results, and check if there is another acceptable option in addition to the favourite option?

**Issue 3-3: MIMO correlation for type II codebook**

* *Agreement in RAN4 #97e (R4-2017681, WF)*
  + *MIMO correlation*
    - *XP Medium as Baseline*
    - *XP (custom) Low only can be considered if XP medium not workable*
* Proposals
  + Option 1: XP Medium (Samsung, QC)
    - Samsung: The performance gain with Type II compared to Type I codebook in XP medium MIMO correlation is larger than in Custom Low correlation cases. Especially for 16x2 ‘Custom Low’, there is marginal gain for Type II codebook.
* Recommended WF
  + Use XP Medium.

**Issue 3-4: Simulation results and gamma value**

* Summary of simulation results for following Type II/Random Type I

**Summary of FDD simulation results**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Antenna configuration | Correlation | Company | SNR Point [dB 95% max TP] | Gamma [95% max TP] | SNR Point [dB 90% max TP] | Gamma [90% max TP] | SNR Point [dB 70% max TP] | Gamma [70% max TP] |
| 16Tx / 2Rx | Medium | E/// | 14.5 | 1.6 | 12.4 | 1.9 | 7.8 | 2.2 |
| Apple |  |  | 10.56 | 2.92 |  |  |
| Samsung | 10.8 | 2.88 | 9.5 | 3.18 | 6.8 | 4.18 |
| Huawei |  |  | 9.82 |  |  |  |
| Custom Low | E/// | 12.8 | 1.7 | 10.9 | 1.8 | 7.2 | 2.1 |
| Samsung | 9.9 | 2.65 | 9.0 | 2.87 | 6.6 | 3.72 |
| 16Tx / 4Rx | Medium | E/// | 7.6 | 2.1 | 6.8 | 2.1 | 4.4 | 2.2 |
| Apple |  |  | 7.06 | 2.83 |  |  |
| Samsung | 8.6 | 2.01 | 7.6 | 2.24 | 5.2 | 2.51 |
| Huawei |  |  | 5.9 |  |  |  |
| Custom Low | E/// | 7.8 | 1.9 | 6.7 | 1.8 | 4.3 | 1.9 |
| Samsung | 6.9 | 2.27 | 5.8 | 2.38 | 4.0 | 2.41 |

**Summary of TDD simulation results**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Antenna configuration | Correlation | Company | SNR Point [dB 95% max TP] | Gamma [95% max TP] | SNR Point [dB 90% max TP] | Gamma [90% max TP] | SNR Point [dB 70% max TP] | Gamma [70% max TP] |
| 16Tx / 2Rx | Medium | E/// | 10.3 | 2.2 | 8.8 | 2.7 | 5.7 | 3.1 |
| Apple |  |  | 11.25 | 2.82 |  |  |
| Samsung | 13.3 | 1.87 | 11.3 | 2.12 | 7.8 | 2.43 |
| Huawei |  |  | 9.82 |  |  |  |
| Custom Low | E/// | 10.0 | 2.0 | 7.9 | 2.3 | 5.4 | 2.8 |
| Samsung | 10.8 | 2.03 | 9.3 | 2.23 | 6.4 | 2.51 |
| 16Tx / 4Rx | Medium | E/// | 5.3 | 2.4 | 4.5 | 2.5 | 2.5 | 2.6 |
| Apple |  |  | 7.15 | 2.81 |  |  |
| Samsung | 9.6 | 1.81 | 8.2 | 1.91 | 5.7 | 1.96 |
| Huawei |  |  | 5.9 |  |  |  |
| Custom Low | E/// | 5.4 | 1.9 | 4.6 | 2.0 | 2.5 | 1.9 |
| Samsung | 9.3 | 1.64 | 7.8 | 1.76 | 4.8 | 1.90 |

* **Observation**
  + For the baseline parameter combination, i.e., Medium correlation + 90% max TP, 4 companies provided simulation results, and the SPAN of the SNR point is quite large for some cases, e.g., 3.7 for TDD 16T4R, 2.5 for TDD 16T2R, 2.9 for FDD 16T2R.
* Recommended WF
  + In the 1st round, encourage companies to double check the simulation results

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | Issue 3-1: Test metric for type II codebook  Issue 3-2: SNR point for type II PMI codebook  Issue 3-3: MIMO correlation for type II codebook  Issue 3-4: Simulation results and gamma value  Others |
| Apple | Issue 3-1: Test metric for type II codebook  Results we presented show delta between Type II and Type I performance. We support recommended WF.  Issue 3-2: SNR point for type II PMI codebook  We see reasonable delta at 90% Max TP. With lower for e.g. 70% Max TP, we expect to see higher TP gain and more delta compared to Type I performance. We are fine with going with 70% max TP if that’s the majority view.  Issue 3-3: MIMO correlation for type II codebook  We support recommended WF.  Issue 3-4: Simulation results and gamma value  Others |
| China Telecom | Issue 3-1: Test metric for type II codebook  Support option 1 for the timely completion of the WI.  Issue 3-2: SNR point for type II PMI codebook  Slightly prefer option 2, which is the baseline and with a wider support from companies.  Issue 3-3: MIMO correlation for type II codebook  Support the Recommended WF.  Issue 3-4: Simulation results and gamma value  Others |
| Qualcomm | Issue 3-1: Test metric for type II codebook  We support Option1. In some cases, E///’s SNR required at test point is an outlier compared to other companies’ results. So, it will be good if they could double check their simulations during the meeting.  Issue 3-2: SNR point for type II PMI codebook  Prefer Option 2.  Issue 3-3: MIMO correlation for type II codebook  Ok with recommended WF.  Issue 3-4: Simulation results and gamma value  Others |
| Samsung | Issue 3-1: Test metric for type II codebook  We support option 1 and recommend WF. Based on the most of companies results, TP ratios are reasonable and the SNR points are workable under the “following Type II PMI vs. random Type I PMI” test metrics  Issue 3-2: SNR point for type II PMI codebook  From our results, we can observe with 70% relative TP point can achieve better performance gap between Type II and Type I compared with 90% relative TP point. We are also OK with 90% relative TP point with majority review.  Issue 3-3: MIMO correlation for type II codebook  We are ok with option 1 and recommended WF.  Issue 3-4: Simulation results and gamma value  Our results will be updated slightly during this meeting. |
| Ericsson | Issue 3-1: Test metric for type II codebook  We are generally fine with Option 1, if the final gamma of Rel-15 Type-II (TP ratio of following Rel-15 Type-II and random Type-I) becomes tighter than the TP ratio of following Type-I and random Type-I).  Issue 3-2: SNR point for type II PMI codebook  We propose to review the simulation summary after the 1st round.  If we observe the gamma with Rel-15 Type-II is tighter than gamma with Type-I, we are also fine to set SNR to 90% of the maximum throughput with the followed Rel-15 Type-II PMI.  Issue 3-3: MIMO correlation for type II codebook  We are fine with the recommended WF, XP medium.  Issue 3-4: Simulation results and gamma value |
| Huawei, HiSilicon | Issue 3-1: Test metric for type II codebook  We prefer option 1. We have observed performance difference between eType II and Type I based on the agreed simulation assumption and test metric. In the meanwhile, candidate test metric: follow eType II TP over random eType II TP suffers from the uncertainty of random eType II implementation among companies. Another candidate test metric: follow eType II TP over follow Type I TP will mix two optional feature into one test. Thus, we choose to stick to the agreement.  Issue 3-2: SNR point for type II PMI codebook  Option 2 and option 3 are both fine for us. We have updated our simulation results for 90% maximum TP. Option 2 is also fine for us since there is reasonable gap between two performances.  Issue 3-3: MIMO correlation for type II codebook  Prefer XP medium. Since there is no issue has been found yet using XP medium, we prefer to stick to the previous agreement.  Issue 3-4: Simulation results and gamma value  We have updated our simulation results in the table.  Besides, we propose to set the required throughput ratio at least larger than γType-I. |
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### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2101322](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101322.zip), HW, CR for Applicability | Apple: Agree that new table with applicability for optional features should be introduced. The applicability rule suggests that same UE feature is used to indicate support of both Type I with >8TX and Type II. In addition to support of 16TX for Type II, other UE features should also be included. |
| China Telecom: Share the similar view with Apple on the optional support of the whole type II codebook feature. In addition, the section title for 6.1.1.3 is duplicated. |
| Intel:  1) Based on 38.822 “Supported max # of configured NZP-CSI-RS resources per CC” (part of 2-33) is mandatory with capability upports feature. Therefore, the original version for Type I PMI is correct. Based on our understanding, same feature cannot be captured in table with optional and mandatory features. Same time, we probably need to define applicability for features/capabilities 2-36 and 2-41 (independent from 2-33) which inform about supported CSI-RS configuration and number of Tx ports for each codebook configuration.  2) Based on our review, Sections 6.3.2.1.5, 6.3.3.1.5, 6.3.2.2.5, 6.3.3.2.5 are not available in Table 6.1.1.4-1 of TS 38.101-1 v16.3.0. Therefore, removing of these sections from Table 6.1.1.4-1 is impossible. |
|  |
| [R4-2101437](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101437.zip), E///, | apple: Sub-section heading cannot be changed based on our understanding of TS drafting rules. We are not sure why 16TX Type I PMI reporting is multiple PMI |
| China Telecom: Support the change from the technical point of view, i.e., multiple PMI for subband reporting, and single PMI for wideband reporting. |
| Ericsson: To Apple, the 16TX Type-I PMI reporting test uses sub-band PMI reporting. This is the reason the title should be ‘Multiple-PMI’. For the sub-section heading, our understanding is we can modify the heading, although we cannot remove section (should be set to ‘Void’). |
| R4-2102939, Samsung, Introduction of PMI test cases with Rel-15 Type II codebook | Moderator’s note: Endorsed draft CR R4-2017569 with updates to the notes in Table 6.3.2.1.5-1, Table 6.3.2.2.5-1, Table 6.3.3.1.5-1 and Table 6.3.3.2.5-1. |
| Company A |
| Company B |
|  |

Note: To save time on typing the comments one by one, companies can also directly revise the draft CR and upload the revision in the draft inbox.

## 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** |
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*Suggestion on WF/LS assignment*

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

## Summary on 2nd round

*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: UE power imbalance requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101366 | Huawei, HiSilicon | Proposal 1: Add the following general rules in the specification and update the test applicability as shown in Table 1:   * For Ues supporting FR1 intra-band contiguous and non-contiguous EN-DC and inter-band EN-DC, where the frequency range of the LTE band is a subset of the frequency range of the NR band, the requirements applicability is specified in Table 9.1.1-3   + For UE only supporting contiguous EN-DC, only performance requirements for contiguous EN-DC in clause 9.5B.1.1 are applicable   + For UE only supporting non-contiguous EN-DC, only performance requirements for non-contiguous EN-DC in 9.5B.1.2 are applicable   + For UE supporting both contiguous and non-contiguous EN-DC, only performance requirements for contiguous EN-DC in 9.5B.1.1 are applicable |
| R4-2101367 | Huawei, HiSilicon | CR: Updates to power imbalance for CA |

## Open issues summary

### Sub-topic 4-1: Test applicability rule for UE power imbalance for EN-DC

**Issue 4-1: Test applicability rule for UE power imbalance for EN-DC**

* Proposals
  + Proposal 1: Add the following general rules in the specification and update the test applicability as shown in Table 1:
    - For Ues supporting FR1 intra-band contiguous and non-contiguous EN-DC and inter-band EN-DC, where the frequency range of the LTE band is a subset of the frequency range of the NR band, the requirements applicability is specified in Table 9.1.1-3
      * For UE only supporting contiguous EN-DC, only performance requirements for contiguous EN-DC in clause 9.5B.1.1 are applicable
      * For UE only supporting non-contiguous EN-DC, only performance requirements for non-contiguous EN-DC in 9.5B.1.2 are applicable
      * For UE supporting both contiguous and non-contiguous EN-DC, only performance requirements for contiguous EN-DC in 9.5B.1.1 are applicable
* Recommended WF
  + Encourage feedback on proposal 1.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | Issue 4-1: Test applicability rule for UE power imbalance for EN-DC |
| Company B | Issue 4-1: Test applicability rule for UE power imbalance for EN-DC |
| CMCC | Issue 4-1: Test applicability rule for UE power imbalance for EN-DC  In our views, there is no need to add the general rules in the specification since the rules has been included in the Table 9.1.1-3 implicitly.  The update of test applicability is as below for reference:   |  |  |  |  | | --- | --- | --- | --- | |  | Inter-band scenarios are not upports | UE indicates “interBandContiguousMRDC”  i.e. support intra-band contiguous EN-DC requirements for supported inter-band EN-DC combinations (Note 1) | UE does not indicate “interBandContiguousMRDC”  i.e. support intra-band non-contiguous EN-DC requirements for supported inter-band EN-DC combinations (Note 1) | | Intra-band scenarios are not supported | N/A | Clause 9.5B.1.1 is executed for inter-band EN-DC scenarios | Clause 9.5B.1.2 is executed for inter-band EN-DC scenarios | | UE does not indicate “*intraBandENDC-Support*” or UE indicates “*both*” in “intraBandENDC-Support”, i.e. supports intra-band contiguous or both intra-band contiguous and non-contiguous EN-DC for supported intra-band EN-DC combinations | Clause 9.5B.1.1 is only executed for intra-band EN-DC scenarios | Clause 9.5B.1.1 is executed for both intra-band and inter-band EN-DC scenarios | Clause 9.5B.1.1 is only executed for intra-band EN-DC scenarios | | UE indicates “*non-contiguous*” in “*intraBandENDC-Support*”, i.e. supports only intra-band non-contiguous EN-DC for supported intra-band EN-DC combinations | Clause 9.5B.1.2 is only executed for intra-band EN-DC scenarios | Clause 9.5B.1.1 is executed for inter-band EN-DC scenarios | Clause 9.5B.1.2 is executed for both intra-band and inter-band EN-DC scenarios |   We are Ok to merge the third row and the fourth row of the original table, but we think it is not necessary to add the “i.e.” to the UE indication. We prefer to modify the table like below and also open to further discuss:   |  |  |  |  | | --- | --- | --- | --- | |  | Inter-band scenarios are not upports | UE indicates “interBandContiguousMRDC” (Note 1) | UE does not indicate “interBandContiguousMRDC”(Note 1) | | Intra-band scenarios are not supported | N/A | Clause 9.5B.1.1 is executed for inter-band EN-DC scenarios | Clause 9.5B.1.2 is executed for inter-band EN-DC scenarios | | UE does not indicate “*intraBandENDC-Support*” or UE indicates “*both*” in “intraBandENDC-Support” | Clause 9.5B.1.1 is only executed for intra-band EN-DC scenarios | Clause 9.5B.1.1 is executed for both intra-band and inter-band EN-DC scenarios | Clause 9.5B.1.1 is only executed for intra-band EN-DC scenarios | | UE indicates “*non-contiguous*” in “*intraBandENDC-Support*” | Clause 9.5B.1.2 is only executed for intra-band EN-DC scenarios | Clause 9.5B.1.1 is executed for inter-band EN-DC scenarios | Clause 9.5B.1.2 is executed for both intra-band and inter-band EN-DC scenarios | |
| Intel | Option 1 from HW is fine for us. Same time, proposal from CMCC is also fine. |
| Qualcomm | The last two bullets in the proposal are already captured in the table 9.1.1-3. We are ok to capture the 1st bullet in the table as well. |
| Docomo | We slightly prefer CMCC’s proposal, but HW’s proposal is also fine. |
| Ericsson | We are fine with the proposal by Huawei. We think the descriptions after ‘i.e.’ is also good to understand the scenario. Maybe we put it in the notes in the footer as follows (based on CMCC version):   |  |  |  |  | | --- | --- | --- | --- | |  | Inter-band scenarios are not upports | UE indicates “interBandContiguousMRDC” (Note 1, Note 2) | UE does not indicate “interBandContiguousMRDC” (Note 1, Note 3) | | Intra-band scenarios are not supported | N/A | Clause 9.5B.1.1 is executed for inter-band EN-DC scenarios | Clause 9.5B.1.2 is executed for inter-band EN-DC scenarios | | UE does not indicate “*intraBandENDC-Support*” or UE indicates “*both*” in “intraBandENDC-Support” (Note 4) | Clause 9.5B.1.1 is only executed for intra-band EN-DC scenarios | Clause 9.5B.1.1 is executed for both intra-band and inter-band EN-DC scenarios | Clause 9.5B.1.1 is only executed for intra-band EN-DC scenarios | | UE indicates “*non-contiguous*” in “*intraBandENDC-Support*” (Note 5) | Clause 9.5B.1.2 is only executed for intra-band EN-DC scenarios | Clause 9.5B.1.1 is executed for inter-band EN-DC scenarios | Clause 9.5B.1.2 is executed for both intra-band and inter-band EN-DC scenarios | | Note 1: Requirements are applicable to intra-band scenarios and only inter-band scenarios from Table 5.5B.4.1-1 of TS 38.101-3 [8] for which Note 4 is applied.  Note 2: UE supports intra-band contiguous EN-DC requirements for supported inter-band EN-DC combinations  Note 3: UE supports intra-band non-contiguous EN-DC requirements for supported inter-band EN-DC combinations  Note 4: UE supports intra-band contiguous EN-DC, or both intra-band contiguous and non-contiguous EN-DC for supported intra-band EN-DC combinations  Note 5: UE supports only intra-band non-contiguous EN-DC for supported intra-band EN-DC combinations | | | | |
| Huawei, HiSilicon | As CMCC indicated, all test applicability rules are implicitly included in the table, also it is the reason that we propose to add the explicitly test applicability rules to facilitate to understand the specification quickly and clearly, especially for readers not involved this discussion, it is very hard to figure out the background logic for that created table by checking all implicitly included possible scenarios.  The proposal from Ericsson to add note for those “i.e” contents is fine for us. |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2101367, HW, | Intel: Corrections is this CR are fine for us. Same time, we think that coordination between changes in this CR and CR R4-2101434 should be further discussed in case changes from CR R4-2101434, which affect section numbering, will be approved. |
|  |
|  |

## 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** |
|  |  |

*Suggestion on WF/LS assignment*

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

### 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

## Summary on 2nd round

*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 #5: NR CA CQI reporting requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2100886 | China Telecom | CR: Adding applicability and requirements for FR1 and FR2 CA CQI reporting test |

## Open issues summary

*No open issue.*

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2100886, CTC, CR on applicaability and requiremets | Intel: Section numbering procedure probably should be updated based on discussion of Issue 2-1 and CR R4-2101434 |
| Qualcomm: Measurement channels should point to CSI RMCs. Section numbering may have to be modified based on the discussion on Spec structure for CA. |
| China Telecom 2:  For the section numbering, pending agreements in Issue 2-1.  @Qualcomm: For the measurement channel configuration, our purpose is to avoid introducing too many new FRC tables in clauseA.4 for each possible bandwidth and CQI index combination, and the same way is utilized in the reference channel configuration for CA power imbalance, e.g., Table 5.2A.2.2-3 in 38.101-4. |

## Summary for 1st round

### Open issues

### 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

## Summary on 2nd round

*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”* |
|  |  |