**3GPP TSG-RAN WG4 Meeting # 98-e R4-201XXXX**

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

**Agenda item:** 7.4.8

**Source:** Moderator (Nokia, Nokia Shanghai Bell)

**Title:** Email discussion summary for [98e][320] NR\_IAB\_Demod

**Document for:** Information

# Introduction

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

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

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

## Background and scope

This T-doc will be used to guide and summarize the email discussion for the topic of Rel-16 IAB demodulation and CSI requirements (AI 7.4.8), with the email thread identifier “[98e][320] NR\_IAB\_Demod”.

The scope of this email discussion are Rel-16 IAB demodulation and CSI requirements, and in particular the agenda items:

7.4.8 Demodulation and CSI requirements

7.4.8.1 General

7.4.8.2 IAB-DU performance requirements

7.4.8.3 IAB-MT performance requirements

Priority topics are marked directly in the open issues’ summaries.

## Email discussion guidelines

Unless different guidance is received from the session chairs, the moderator would like to ask companies to adhere to the following guidelines, when taking part in [98e][320] NR\_IAB\_Demod.

Please also check the “R4-21xxxxx RAN4#98-e e-meeting arrangements and guidelines v1.1”, available on the reflector, for fundamental guidelines and deadlines.

The preferred method of commenting is to add/update your company’s view directly in this email summary document (use change marks if appropriate) and upload it to [320] NR\_IAB\_Demod.

* Draft folder:
 [[98e][320] NR\_IAB\_Demod](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Inbox/Drafts/%5B98e%5D%5B320%5D%20NR_IAB_Demod)
https://www.3gpp.org/ftp/TSG\_RAN/WG4\_Radio/TSGR4\_98\_e/Inbox/Drafts/%5B98e%5D%5B320%5D%20NR\_IAB\_Demod
* It is expected delegates will download the latest version (including other companies’ versions) of the summary document, insert comments and upload it again.
To ensure the comments are captured timely and correctly, delegates are encouraged to:
	+ Rename the file by adding your company name.
	Example: “Summary\_320\_1st round v0**1\_CATT\_Nok**.docx”
	+ Send an email on the reflector informing that comments are made specifying the updated file name.
	+ Please check for possibly updated base document versions, right before uploading your updates.
* Please do not hesitate to mark your company as supporting a certain option directly in this document.
Please refrain from rewriting existing options and proposed WFs; ask the moderator (in your company’s comment) to modify/add.
* It is encouraged to give a short reasoning for each view expressed (1-2 sentences are recommended).
Please avoid statements like “Option X”, without further explication or reasoning (unless it is the last vote enabling acceptance of a proposal).
* The moderator is trying to provide a new “cleaned” revision of the base document once a day.
Example: “Summary\_320\_1st round v0**3**.docx”
	+ Comments only received by email will be merged into the summary document by the moderator on a best effort basis.

# Topic #1: General

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2102105 | Ericsson | Tdoc Title: IAB demodulation general considerations**Proposal 1: Do not specify how HARQ feedback is sent to the TE. (It could be via Uu or via proprietary means).****Proposal 2: Write the test procedure such that coarse synchronization is not specified. (It can be achieved by transmitting and detecting SSB or via proprietary means).****Proposal 3: Provide DM-RS for fine synchronization. Optionally, TRS can also be transmitted during the test for fine synchronization.**[Moderator]: Proposals captured in Topic #3: IAB-MT performance requirements |

## Open issues summary and views’ collection for 1st round

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

*Interested companies are expected to add their views directly under the respective issues in a dialogue-like form, i.e., identical to how the chair would record views during a f2f meeting.*

*Please add further table rows as required and do not change previous comments of your company or other companies. Answering to questions from other companies is encouraged.*

### Sub-topic 1-1: DraftCR, bigCR, and bigTP work split

*Sub-topic description:*

The email discussion list shared by the chairs before the meeting, request for “CR/TP work split for Demod requirements and conformance testing expected” in [98e][320] NR\_IAB\_Demod.

Concerning the bigCR/TP split, the vice-chair has exchanged with the WI rapporteur, the TS editor, TR editor, and the RF/demod moderators. The following “big documents” will be proposed in the Demod and RF session for the experts to evaluate:

38.174 Performance requirements

1x bigCR, for RF

1x bigCR, for Demod

38.???-1 Conducted conformance testing

1x bigTP, for RF

1x bigTP, for Demod

38.???-2 Radiated conformance testing

1x bigTP, for RF

1x bigTP, for Demod

Care needs to be taken for the appendices, where there might be overlap between RF and Demod. The specification editor needs support to merge the technical bigCRs from RF and Demod.

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

**Issue 1-1-1: IAB demodulation draftCR, bigCR, bigTP work-split.**

* Proposals
	+ Option 1 (Moderator):

WORKSPLIT TABLE WITHOUT COMPANY NAMES WILL BE INCLUDED IN MONDAY’S KICK-OFF EMAIL (8am UTC).
Please volunteer on Monday by email for draftCR responsibilities.
Ultimately, the filled-in table will be included in this option.
There are 22 tasks to find volunteers for and 5 companies have been active in the discussion.
It is recommended for each company to volunteer for 4 tasks in a first round and then fill in the remaining ones in a second round.

* + Option 2: Other options not precluded.
* Recommended WF
	+ Please check the proposed work-split categories concerning completeness and fill in your company name, where you see appropriate.
	It is often recommended to not sign up for the same sections in several different specifications, to allow for cross verification between different contributors. However, given the large amount of work to be done, the moderator will not push to adhere to this way of working.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | We agree with the proposed work split. We already volunteered for 4 tasks in the reply to the moderator’s email. |
| YYY |  |
| XXX |  |

### Sub-topic 1-2: Other

*Sub-topic description:*

*In this sub-topic companies are invited to bring issues to the attention of the group, which have not been captured in the previous sub-topics.*

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

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Title, Source |
| Company A |
| Company B |
|  |
|  | Moderator: No CRs/TPs in this meeting. |
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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**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company, WF or LS lead** |
| #1 | None |  |

### 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 (if applicable)

## Summary on 2nd round (if applicable)

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

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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”* |

# Topic #2: IAB-DU performance requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101262 | Intel Corporation | Tdoc Title: Views on NR IAB-DU demodulation performance requirementsPUSCH**Proposal #1: For IAB-DU 16QAM 2T2R radiated test cases reuse Rel-16 gNB performance requirements.**PUSCH - Channel model**Proposal #2: All existing channel models used in Rel-15 BS testing should be re-used for IAB-DU.**PUSCH - Inclusion of CA notes**Proposal #3: Follow Rel-15 approach and clarify that CA can be operated but is tested per carrier.**PUSCH - MCS**Proposal #4: Keep all MCS from BS demodulation requirements for IAB-DU demodulation requirements.**PUSCH - Test requirements for PUSCH with 30% of maximum throughput**Proposal #5: All existing requirements for PUSCH with 30% of maximum throughput should be re-used for IAB-DU.**PUSCH - Transform precoding**Proposal #6: Include requirements for PUSCH with transform precoding enabled for IAB-DU testing.**PUSCH - Test requirements for UCI multiplexed on PUSCH**Proposal #7: All existing requirements for UCI multiplexed on PUSCH should be re-used for IAB-DU.**PUSCH - Applicability rule**Proposal #8: For IAB-DU performance requirements use existing applicability rule for CBW, SCS and mapping type. Besides that, define applicability rule to test only maximum number of antennas declared to be supported by the manufacturer for the respective BS type, i.e., up to 8Rx in conducted/hybrid testing and up to 2Rx in OTA testing.**PUCCH - Multi-slot**Proposal #9: All existing requirements for multi-slot PUSCH should be re-used for IAB-DU and corresponding declaration on supporting of this feature should be defined.**PUCCH - Number of test cases and applicability rule**Proposal #10:** **Keep all the PUCCH requirements and define the following applicability rule: • If IAB-DU declares to support more than two PUCCH formats and format 0 is supported, then limit the number of tests to format 0 and any other case chosen by the manufacturer.  • If IAB-DU declares to support more than two PUCCH formats and format 0 is not supported, then limit the number of tests to any two cases chosen by the manufacturer. • In any other cases apply requirements for declared PUCCH formats.**PRACH - Formats and applicability rule**Proposal #11: All existing requirements and applicability rules for PRACH should be re-used for IAB-DU and corresponding declaration on supporting of this feature should be defined. The following new one applicability rule should be added: “For IAB-DU declares to support more than one PRACH formats, limit the number of tests to any two cases chosen by the manufacturer. If IAB-DU declares to support more than one PRACH formats where formats for both long and short PRACH sequences are presented, require to choose formats with different sequences.”** |
| R4-2101293 | Huawei, HiSilicon | Tdoc Title: Discussion on NR IAB DU demodulation performance requirementsGeneral - Applicability rules (antennas)**Proposal 1: Define IAB-DU requirements with the general applicability rule that test only the highest number of supported antennas for conducted test.**General - Channel model (PUSCH, PUCCH, PRACH)**Proposal 2:** **Introduce all channel models used in Rel-15 except TDLB100-400 for FR1.**General - Inclusion of CA notes**Proposal 3: Follow Rel-15 approach and clarify that CA can be operated but is tested per carrier.**General - CBW/SCS**Proposal 4: For IAB-DU, specify requirements for 40MHz for 30 kHz, 50 MHz for 60 kHz, and 100 MHz for 120 kHz.**PUSCH MCS**Proposal 5: Keep all MCS for BS demodulation requirements.**PUSCH transform precoding**Proposal 6: Re-use only requirements for PUSCH with transform precoding disabled.**PUCCH multi-slot**Proposal 7: Skip cases for multi-slot PUCCH.**PUCCH number of test cases**Proposal 8: Keep all the PUCCH requirements and related test applicability rule, if BS declares to support more than one PUCCH formats, limit any one case to be tested chosen by the manufacturer using applicability rule.**PRACH - Formats**Proposal 9: Keep only typical preamble formats selected by companies and only fading cases with the applicability rule that for BS declares to support more than one PRACH formats, limit the number of tests to any one case chosen by the manufacturer using applicability rule.** |
| R4-2102092 | Nokia, Nokia Shanghai Bell | Tdoc Title: On NR IAB-DU demodulation requirementsGeneralObservation 1: IAB-MTs and access UEs will be served by the IAB-DU. Both use cases need to be covered by the IAB-DU specification.General - Propagation conditions (PUSCH, PUCCH)Observation 2: 300 and 400 maximum Doppler frequencies correspond to the typical urban speed of maximum 62 kmph. Coming back to Observation 1, we don’t see it possible to further down select the channel models without overly compromising performance for access UEs.**Proposal 1: RAN4 to re-use all existing channel models used in Rel-15 BS demodulation testing for IAB-DU PUSCH and PUCCH testing.**PUSCH - Carrier Aggregation**Proposal 2: Do not include performance requirements for CA.****Proposal 3: In case performance requirements for CA are decided to be included, follow the Re-15 approach and specification text.**PUSCH - MCS and dft-s-OFDM**Proposal 4: Concerning PUSCH MCS, keep all MCS for BS demodulation requirements, but with applicability rule that IAB-DU only needs to pass the test with the supported highest modulation order based on BS declaration.****Proposal 5: In general, copy all Rel-15 PUSCH BS demod requirements by default and discuss applicability rule inclusion or adaptation to reduce the number of tests.** [Moderator]: Too general to be included in a single place. Please propose this point during the discussions, where appropriate.**Proposal 6: Concerning PUSCH transform precoding, include requirement for PUSCH with transform precoding enabled, create a manufacture declaration to allow dft-s-OFDM support, and add applicability rule to only test, if dft-s-OFDM is supported.**PUCCH - Multi-slotNo proposals or observations.PUCCH - Number of test cases/PUCCH formats**Proposal 7: Only keep requirements for PUCCH formats that infrastructure manufacturers plan to implement/configure in IAB-nodes, but at least format 0 and format 2.**PRACH formats**Proposal 8: Only keep requirements for PRACH formats that infrastructure manufacturers plan to implement/configure in IAB-nodes, but at least formats 0, A2, and C0.****Proposal 9: Re-use the BS demodulation applicability rules for IAB-DU PRACH.**PRACH - Propagation condition**Proposal 10: For PRACH, copy-paste and test requirements for all propagation conditions, except for AWGN.** |
| R4-2102106 | Ericsson | Tdoc Title: IAB demodulation DU considerationsPUSCH channel models**Proposal 1: Adopt all release 15 propagation channels into the IAB requirements.**General - Carrier aggregation**Proposal 2: Include notes on carrier aggregation.**PUSCH configurations**Proposal 3: Include requirements for QPSK, 16QAM and DFT-s-OFDM (and declaration of support).**PUCCH configurations**Proposal 4: Include multi-slot PUCCH requirements (and declaration of support)**PRACH configurations**Proposal 5: Copy all PRACH requirements (and declaration of support)**Test applicability for IAB-DU (PUSCH and PUCCH)**Proposal 6: If 2 SCS are supported, test QPSK with highest SCS and other modulation orders with the lowest SCS. (If one SCS supported, test all modulation orders with the same SCS).****Proposal 7: If more than one PUCCH format and more than one SCS are supported, test each PUCCH format with one SCS only and ensure that all SCS are tested with at least one PUCCH format. If one PUCCH format and more than one SCS are supported, test the PUCCH format with both SCS.** [Moderator]: The Tdoc text states that all other rules should be kept. |

## Open issues summary and views’ collection for 1st round

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*Interested companies are expected to add their views directly under the respective issues in a dialogue-like form, i.e., identical to how the chair would record views during a f2f meeting.*

*Please add further table rows as required and do not change previous comments of your company or other companies. Answering to questions from other companies is encouraged.*

### Sub-topic 2-1: General

*Sub-topic description:*

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

**Issue 2-1-1: Applicability rule for number of antennas**

* Prior agreements (R4-2017673)
	+ General RX demodulation branches
		- All existing antenna configurations shall be kept, when re-using BS demod requirements. An applicability rule shall be defined to test only maximum number of antennas declared to be supported by the manufacturer for the respective BS type, i.e., up to 8Rx in conducted/hybrid testing and up to 2Rx in OTA testing.
* Proposals
	+ Option 1 (Huawei): Define applicability rule that test only the highest number of supported antennas for conducted test.
	+ Option 2 (Intel): Define applicability rule to test only maximum number of antennas declared to be supported by the manufacturer for the respective BS type, i.e., up to 8Rx in conducted/hybrid testing and up to 2Rx in OTA testing
* Recommended WF
	+ In the moderator’s opinion, option 1 is included in the prior agreements.
	Hence, recommended to not further discuss this topic and leave prior agreements in force.

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| **Company** | **Comments** |
| Ericsson | Our understanding is that this is already agreed; if not we support option 2. |
| Nokia, Nokia Shanghai Bell | From our point of view, prior agreement already covers the new received proposals. We do not see a need to update the exiting agreement. |
| XXX |  |

**Issue 2-1-2: CBW/SCS**

* Prior agreements (R4-2017673)
	+ General SCS/CBW combinations
		- Keep existing full set of requirements, w.r.t. SCS/CBW combination.
		Test applicability rules can be updated, to reduce to number of tests required.
* Proposals
	+ Option 1 (Huawei): Specify requirements for 40MHz for 30 kHz, 50 MHz for 60 kHz, and 100 MHz for 120 kHz.
* Recommended WF
	+ Option 1 seems to overturn the prior agreement.
	It is recommended to keep prior agreements.

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| **Company** | **Comments** |
| Ericsson | The requirements for the BS are already available and can be re-used. Only the highest bandwidth should be tested. |
| Nokia, Nokia Shanghai Bell | In our CR [R4-2100551] submitted to this meeting we are proposing to improve the formulation of applicability rule for different channel bandwidth in 38.141-1, section 8.1.2.1.2. Nevertheless, our preference is still to follow the existing BS applicability rules, i.e., the tests shall be done for the widest supported channel bandwidth of each supported subcarrier spacing. |

**Issue 2-1-3: Carrier aggregation**

* Proposals
	+ Option 1 (Ericsson, Huawei, Intel): Follow Rel-15 approach and include notes that CA can be operated and is tested per carrier.
	+ Option 2 (Nokia): Do not include performance requirements for CA.
	In case performance requirements for CA are decided to be included, follow the Re-15 approach and specification text.
* Recommended WF
	+ Discuss in first round. Option 1 seems like a possible compromise.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | We prefer Option 2 but can compromise to Option 1. |

### Sub-topic 2-2: PUSCH

*Sub-topic description*

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

**Issue 2-2-1: Rel-16 fixes to Rel-15 BS demodulation requirements**

* Prior agreements (R4-2017673)
	+ Inclusion of Rel-16 HST requirements
		- Do not include existing Rel-16 HST requirements (including UL TA).
	+ Other Rel-16 BS demod requirements
		- Do not include Rel-16 BS demod requirements, i.e., the following (HST discussed separately)
			* 30% TPUT requirements for PUSCH with transform precoding disabled.
			* 2-step RACH
			* NR-U
			* URLLC 0.001% BLER
			* URLLC high reliability
			* URLLC low latency
* Further Background:
	+ Addressing of testability issue for some radiated tests in NR\_newRAT: In Rel-16 it was identified that MCS configuration for 16QAM 2T2R radiated test cases was chosen too high that corresponding SNR cannot be reached during the OTA test (SNR<20dB). To address this issue, corresponding performance requirements were changed in Rel-16 and defined with lower MCS.
* Proposals
	+ Option 1 (Intel): For IAB-DU 16QAM 2T2R radiated test cases reuse BS performance requirements with Rel-16 fixes.
* Recommended WF
	+ Agree to option 1.

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| **Company** | **Comments** |
| Ericsson | The Intel proposal makes sense; these requirements were a correction of rel-15 and not a new feature. They are mature and agreed. So we support option 1. |
| Nokia, Nokia Shanghai Bell | We agree to apply proposed Rel-16 fix for Rel-15 requirements, i.e., Option 1 is fine. |

**Issue 2-2-2: Channel model**

* Proposals
	+ Option 1 (Intel, Nokia, Ericsson): All existing channel models used in Rel-15 BS testing should be re-used.
	+ Option 2 (Huawei): Introduce all channel models used in Rel-15 except TDLB100-400 for FR1.
* Recommended WF
	+ Further discuss during first round.

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| **Company** | **Comments** |
| Ericsson | One question is whether a deployment of an IAB next to a highway is ruled out, or why to rule it out ?  |
| Nokia, Nokia Shanghai Bell | Based on a simple calculation presented in our contribution, we show that 400 Hz maxim Doppler frequency in UL corresponds to the maximum speed of 62 kmph (3.5 GHz carrier frequency). In our opinion, it is still a typical city vehicle speed. Taking into account the DU serves both access UEs and MTs, the TDLB100-400 channel model can be kept in the requirements (Option 1). |

**Issue 2-2-3: MCS**

* Proposals
	+ Option 1 (Intel, Huawei): Keep all MCS from BS demodulation requirements for IAB-DU demodulation requirements.
	+ Option 2 (Nokia): Keep all MCS for BS demodulation requirements, but with applicability rule that IAB-DU only needs to pass the test with the supported highest modulation order based on BS declaration.
	+ Option 3 (Ericsson): Include requirements for QPSK, 16QAM (and declaration of support).
	Add applicability rule that highest modulation order is tested only with lowest supported SCS and other modulation orders only with highest supported SCS.
* Recommended WF
	+ Further discuss during first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | In all Options, it is proposed to keep all MCSs from BS Demod in IAB requirements.We still prefer to reduce the testing effort, either with Option 2 or with Option 3. |

**Issue 2-2-4: Requirements with 30% max TPUT**

* Prior agreements (R4-2017673)
	+ Inclusion of Rel-16 HST requirements
		- Do not include existing Rel-16 HST requirements (including UL TA).
	+ Other Rel-16 BS demod requirements
		- Do not include Rel-16 BS demod requirements, i.e., the following (HST discussed separately)
			* 30% TPUT requirements for PUSCH with transform precoding disabled.
			* 2-step RACH
			* NR-U
			* URLLC 0.001% BLER
			* URLLC high reliability
			* URLLC low latency
* Proposals
	+ Option 1 (Intel): All existing requirements for PUSCH with 30% of maximum throughput should be re-used for IAB-DU.
* Recommended WF
	+ Option 1 seems to overturn the prior agreement.
	Note: No demod requirements for transform precoding enabled are current in BS demod specification.
	It is recommended to keep prior agreements.

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| **Company** | **Comments** |
| Ericsson | The intel proposal makes sense; these requirements were not really a new feature but rather adding a loose end from rel-15. The requirements are available in the spec and mature. |
| Nokia, Nokia Shanghai Bell | We prefer not to step back and not to re-discuss previously achieved agreements. |

**Issue 2-2-5: Transform precoding**

* Proposals
	+ Option 1 (Intel): Include requirements for PUSCH with transform precoding enabled
	+ Option 2 (Huawei): Re-use only requirements for PUSCH with transform precoding disabled.
	+ Option 3 (Nokia, Ericsson): Include requirements, create a manufacture declaration to allow dft-s-OFDM support, and add applicability rule to only test, if dft-s-OFDM is supported.
* Recommended WF
	+ Further discuss during first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | In our opinion, a viable IAB-node does not necessarily need to support dft-s-OFDM. Hence, transform precoding requirements should only be tested, if support of it is declared. |

**Issue 2-2-6: UCI multiplexed on PUSCH**

* Proposals
	+ Option 1 (Intel): All existing requirements for UCI multiplexed on PUSCH should be re-used.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ It was not proposed in the last meetings to exclude UCI multiplexed on PUSCH.
	As such it is recommended to agree to option 1.

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| **Company** | **Comments** |
| Ericsson | Support option 1 |
| Nokia, Nokia Shanghai Bell | We do not find any reasons to exclude UCI multiplexed on PUSCH requirements, Option 1 is fine. |

**Issue 2-2-7: Applicability rule on SCS**

* Proposals
	+ Option 1 (Intel): Use existing applicability rule for SCS.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Further discuss during first round.

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| **~~Company~~** | **~~Comments~~** |
| ~~XXX~~Ericsson | As indicated for 2-2-3, we think test coverage could still be reasonable if we would apply the rule of lowest SCS for highest MCS and highest SCS for the other MCS. |
| Nokia, Nokia Shanghai Bell | Agree with Option 1. |

**Issue 2-2-8: Applicability rule on CBW**

* Proposals
	+ Option 1 (Intel, Ericsson): Use existing applicability rule for CBW.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Further discuss during first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | Agree with Option 1. |

**Issue 2-2-9: Applicability rule on mapping type**

* Proposals
	+ Option 1 (Intel, Ericsson): Use existing applicability rule for mapping type.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Further discuss during first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | Agree with Option 1. |

### Sub-topic 2-3: PUCCH

*Sub-topic description*

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

**Issue 2-3-1: Multi-slot**

* Proposals
	+ Option 1 (Intel, Ericsson): Include multi-slot PUCCH cases and keep existing BS demodulation-based test applicability rule (“multi-slot PUCCH requirement tests shall apply only if the BS supports it”).
	+ Option 2 (Huawei): Skip cases for multi-slot PUCCH.
* Recommended WF
	+ Further discuss during first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | We support Option 1. |

**Issue 2-3-2: Channel model**

* Proposals
	+ Option 1 (Huawei, Nokia): All existing channel models used in Rel-15 BS testing should be re-used.
* Recommended WF
	+ Note: PUCCH channel models do not contain TDLB100-400.
	Agree on option 1.

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

**Issue 2-3-3: Applicability rule on number of test cases and formats**

* Prior agreements (R4-2017673)
	+ Keep all the PUCCH requirements and related test applicability rule, if BS declares to support more than one PUCCH formats, limit the number of tests chosen by the manufacturer using applicability rule. FFS: Exact limiting of tests.
* Proposals
	+ Option 1 (Intel): Keep all the PUCCH requirements and define the following applicability rule:
		- If IAB-DU declares to support more than two PUCCH formats and format 0 is supported, then limit the number of tests to format 0 and any other case chosen by the manufacturer.
		- If IAB-DU declares to support more than two PUCCH formats and format 0 is not supported, then limit the number of tests to any two cases chosen by the manufacturer.
		- In any other cases apply requirements for declared PUCCH formats.
	+ Option 2 (Huawei): Keep all the PUCCH requirements and related test applicability rule, if BS declares to support more than one PUCCH formats, limit any one case to be tested chosen by the manufacturer using applicability rule.
	+ Option 3 (Nokia): Only keep requirements for PUCCH formats that infrastructure manufacturers plan to implement/configure in IAB-nodes, but at least format 0 and format 2.
	+ Option 4 (Ericsson): If more than one PUCCH format and more than one SCS are supported, test each PUCCH format with one SCS only and ensure that all SCS are tested with at least one PUCCH format. If one PUCCH format and more than one SCS are supported, test the PUCCH format with both SCS.
* Recommended WF
	+ Discuss during first round.
	+ For now, the proposals are quite diverse. Please indicate, if compromises are possible.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We do not see a justification to declare support for some formats, but then choose which ones to test. Our view is that if a format is supported it should be tested; but there is always the possibility not to declare support (which means no test).Our general view is that all formats could be included as requirements and support/testing declared. There is no cost to including formats, and it gives the advantage of providing a flexible toolbox for IAB solutions. |
| Nokia, Nokia Shanghai Bell | The idea of our proposal (Option 3) is to collect PUCCH formats possible for implementation in IAB and keep only those in the requirements. If other companies see a need for more flexibility, then we will also agree to keep all PUCCH formats in the requirements from BS, and formulate an applicability rule as a combination of Options 2 and 4:- If one PUCCH format and more than one SCS are supported, test the PUCCH format with both SCS.- If more than one PUCCH format and one SCS are supported, test any one format /two formats chosen by the manufacturer.- If more than one PUCCH format and more than one SCS are supported, ensure that all SCS are tested with at least one PUCCH format chosen by the manufacturer. |

### Sub-topic 2-4: PRACH

*Sub-topic description*

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

**Issue 2-4-1: Channel model**

* Proposals
	+ Option 1 (Huawei, Nokia): All existing channel models used in Rel-15 BS testing should be re-used, except for AWGN (i.e., fading case only).
	+ Option 2 (Ericsson): Copy all PRACH requirements (and declaration of support).
* Recommended WF
	+ Note: PRACH channel models do not contain TDLB100-400.
	Discuss in first round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Fading case only is Ok. |
| Nokia, Nokia Shanghai Bell | In our view, AWGN testing does not offer much additional insight into the receiver performance. Hence, we prefer Option 1. |

**Issue 2-4-2: Formats to include in specification**

* Proposals
	+ Option 1 (Huawei): Keep only typical preamble formats selected by companies.
	+ Option 2 (Nokia): Only keep requirements for PRACH formats that infrastructure manufacturers plan to implement/configure in IAB-nodes, but at least formats 0, A2, and C0.
	+ Option 3 (Ericsson): Copy all requirements for all PRACH formats. Vendor can declare which ones are supported/tested.
* Recommended WF
	+ Discuss in first round.

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | Including all of the formats and declaring which are supported/tested has no cost in terms of standardization effort and does not imply any greater testing effort than only supporting certain formats. Including all formats provides a toolbox for developing IAB that is flexible, which is important since the deployment plans for IAB have not yet matured so far that it is clear what will be the most effective scenarios for IAB. |
| Nokia, Nokia Shanghai Bell | We propose other companies to indicate typical preamble formats to be kept in the requirements. Our preference is Option 2. If other companies prefer more flexibility we can also consider Option 3.  |

**Issue 2-4-3: Applicability rule for formats**

* Proposals
	+ Option 1 (Nokia): Re-use the BS demodulation applicability rules for IAB-DU PRACH.
	+ Option 2 (Huawei): Applicability rule that for BS declares to support more than one PRACH formats, limit the number of tests to any one case chosen by the manufacturer using applicability rule.
	+ Option 3 (Intel): All existing requirements and applicability rules for PRACH should be re-used for IAB-DU and corresponding declaration on supporting of this feature should be defined. The following new one applicability rule should be added:
	“For IAB-DU declares to support more than one PRACH formats, limit the number of tests to any two cases chosen by the manufacturer. If IAB-DU declares to support more than one PRACH formats where formats for both long and short PRACH sequences are presented, require to choose formats with different sequences.”
* Recommended WF
	+ Discuss in first round.

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | Our view is that if a format is declared to be supported then it should be tested. It should of course be possible to not declare support for (and hence not test) formats. |
| Nokia, Nokia Shanghai Bell | In addition to Option 1 we can also agree with Option 3. |

### Sub-topic 2-5: Summary of requirement re-use (informative)

*Sub-topic description*

Using tables to track previously agreed and proposed main adaptations. Not all details are captured.
The agreements captured in the text of this summary document, as well as WFs, supersede the informative tables below.

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

Table: BS requirement re-use table - FR1 (Informative)
Previous state: End of RAN4#97-e

|  |  |  |
| --- | --- | --- |
| **Feature** | **Previous State** | **Adaptations** |
| Rel-15 |
| PUSCH with transform precoding disabled | MCS: 2, 16, 19Channel: TDLB100-400 Low, TDLC300-100 Low, TDLA30-10 Low |   |
| PUSCH with transform precoding enabled | MCS: 2Channel: TDLB100-400 Low |   |
| UCI multiplexed on PUSCH | MCS: 16Channel: TDLC300-100 Low |   |
| PUCCH | format 0-4Channel: TDLC300-100 Low |   |
| Multi-slot PUCCH | format 1 only |   |
| PRACH | format 0 (conducted only), A1, A2, A3, B4, C0, C2; unrestricted set onlyChannel: AWGN, TDLC300-100 Low FO=400Hz |   |
| Rel-16 |
| ~~PUSCH with transform precoding disabled (30% TPUT)~~ |   |   |
| ~~PUSCH for high speed train~~ |   |   |
| ~~UL timing adjustment~~ |   |   |
| ~~PRACH HST~~ |   |   |
| ~~2-step RACH~~ |   |   |
| ~~NR-U~~ |   |   |
| ~~URLLC 0.001% BLER~~ |   |   |
| ~~URLLC high reliability~~ |   |   |
| ~~URLLC low latency~~ |   |   |

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

Table: BS requirement re-use table - FR2 (Informative)
Previous state: End of RAN4#97-e

|  |  |  |
| --- | --- | --- |
| **Feature** | **Previous State** | **Adaptations** |
| Rel-15 |
| PUSCH with transform precoding disabled | MCS: 2, 16, 19Channel: TDLA30-300 Low, TDLA30-75 Low |   |
| PUSCH with transform precoding enabled | MCS: 2Channel: TDLA30-300 Low |   |
| UCI multiplexed on PUSCH | MCS: 16Channel: TDLA30-300 Low |   |
| PUCCH | format 0-4, no multi-slot for FR2Channel: TDLA30-300 Low |   |
|   |   |   |
| PRACH | A1, A2, A3, B4, C0, C2; unrestricted set onlyChannel: AWGN, TDLA30-300 Low FO=4000Hz |   |
| Rel-16 |
| ~~PUSCH with transform precoding disabled (30% TPUT)~~ |   |   |
| ~~2-step RACH~~ |   |   |
| ~~URLLC high reliability~~ |   |   |
| ~~URLLC low latency~~ |   |   |

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

### Sub-topic 2-6: Other

*Sub-topic description:*

*In this sub-topic companies are invited to bring issues to the attention of the group, which have not been captured in the previous sub-topics.*

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

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Title, Source |
| Company A |
| Company B |
|  |
|  | Moderator: No CRs/TPs/etc. |
|  |
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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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

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

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

# Topic #3: IAB-MT performance requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Tdoc Title: Proposal 1:Observation 1: |
| R4-2102105 | Ericsson | Tdoc Title: IAB demodulation general considerations**Proposal 1: Do not specify how HARQ feedback is sent to the TE. (It could be via Uu or via proprietary means).****Proposal 2: Write the test procedure such that coarse synchronization is not specified. (It can be achieved by transmitting and detecting SSB or via proprietary means).****Proposal 3: Provide DM-RS for fine synchronization. Optionally, TRS can also be transmitted during the test for fine synchronization.**Moderator note: Tdoc submitted to AI 7.4.8.1 (General). |
| R4-2101263 | Intel Corporation | Tdoc Title: Views on NR IAB-MT demodulation performance requirementsPDSCH - MCS**Proposal #1: 16QAM shall be tested for IAB-MT.****Proposal #2: Reuse UE FR1 256QAM performance requirements for IAB-MT. Further discuss 256QAM requirements for FR2 after completion of Rel-16 UE FR2 256QAM requirements definition.**PDSCH - Mapping type**Proposal #3 Include requirements for mapping type A and B without applicability rules.**PDSCH - PRB bundling size**Proposal #4: Only keep requirements with wideband PRB bundling size and PRB bundling size 2.**PDSCH - Enhanced receiver**Proposal #5: Include requirements for enhanced receiver Type 1 but allow to declare support of it.**PDSCH - Overlapped CSI-RS**Proposal #6: Skip PDSCH cases for CSI-RS overlapped with PDSCH.**PDSCH - Co-existence with LTE CRS**Proposal #7: Skip PDSCH cases for co-existence with LTE CRS.**PDCCH - Aggregation level**Proposal #8: Include all PDCCH requirements and require IAB-MT to pass all of them.**PDCCH - Test parameters simplification**Proposal #9: Keep the CSI-RS for tracking parameters for IAB-MT node PDCCH test cases from the UE PDCCH performance requirements.**PBCH**Proposal #10: Reuse UE PBCH requirements for IAB-MT node.**CSI - Requirements down-scoping**Proposal #11: Reuse all CQI reporting test cases which were defined for TDD duplex mode for 4 Rx conducted and 2 Rx radiated requirements except conducted test case with sub-band CQI reporting granularity.**[Moderator]: Tdoc makes observation of “conducted test case with sub-band CQI reporting granularity” being 2 tap channel model.**Proposal #12: Reuse all PMI reporting test cases which were defined for TDD duplex mode for 4 Rx conducted and 2 Rx radiated requirements but change report configuration and CSI-RS resource type from aperiodic to periodic.****Proposal #13: Reuse all RI reporting test cases which were defined for TDD duplex mode for 4 Rx conducted and 2 Rx radiated requirements but change report configuration and CSI-RS resource type from aperiodic to periodic.**CSI - Test parameter simplification**Proposal #14: Do not remove the following parameters from CSI reporting requirements and leave them up to implementation: PDCCH configuration, CSI-RS for tracking, ZP CSI-RS.** |
| R4-2101294 | Huawei, HiSilicon | Tdoc Title: Discussion on NR IAB MT demodulation performance requirementsGeneral - General approach**Proposal 1: Consider IAB-MT as a part of a network node with test setup and performance requirements based on the BS approach.**General - Detailed test setup**Proposal 2: For IAB-MT, use the testing method same as normal BS and synchronization provided via the digital feedback link from the tester or by a common (e.g., GNSS) source.**General - Basis for requirement re-use**Proposal 3: Define IAB MT performance requirements solely based on Rel-15 UE performance requirements. Test cases can be further down selection, configurations which has no influence on performance can be further discussed to kept or removed; configurations which has influence on performance can be further discussed to changed, kept or removed.****Proposal 4: For IAB-MT, only define cases with propagation condition of TDLA30-10 for FR1 and TDLA30-75 for FR2.****Proposal 5: For IAB-MT, only define cases with low antenna correlation.**Observation 1: Only 10 cases to be re-simulated for IAB-MT.**Proposal 6: Re-simulate cases that propagation condition and/or antenna correlation is changed.****Proposal 7: Do not introduce PBCH requirements for IAB-MT.** [Moderator]: Captured in “PBCH” section.General - Requirements for MT types and classes**Proposal 8: For most of cases, the same requirements apply for all classes. For other cases, if companies think applicability rule can be defined for different classes, discuss them case by case.**General - TDD patternObservation 2: With other configurations same, there is negligible performance difference between different TDD UL-DL patterns.**Proposal 9: Reuse default TDD UL-DL pattern from BS requirements for IAB MT requirements definition (15, 60, 120 kHz SCS: 3D1S1U, S=10D:2G:2U; 30 kHz SCS: 7D1S2U, S=6D:4G:4U) and the same requirements are applicable to FDD and TDD with different UL-DL patterns.****Proposal 10: PDSCH is scheduled only on ‘D’ slots without CSI-RS resource (include TRS) allocated.**General - Testing in both conducted and radiated testing**Proposal 11: Define applicability rule same as UE, i.e. the conducted minimum requirements specified in this specification shall be met in all applicable scenarios for FR1. The radiated minimum requirements specified in this specification shall be met in all applicable scenarios for FR2.**PDSCH - MCS**Proposal 12: For IAB-MT, define PDSCH requirement without considering 16QAM.****Proposal 13: Do not define 256QAM requirements for IAB-MT.**PDSCH - Mapping Type**Proposal 14: Only keep PDSCH performance requirements for mapping Type-A.**PDSCH - Enhanced receiver**Proposal 15: Skip PDSCH cases for enhanced receiver Type 1.**PDSCH - CSI-RS overlapped with PDSCH**Proposal 16: Skip PDSCH cases for CSI-RS overlapped with PDSCH.**PDSCH - Relative TPUT and slot configuration**Proposal 17: The SNR of achieving relative throughput (e.g. 70%) can be independent on the slot configuration.** [Moderator]: Merged in “General” section.PDSCH - Test parameters specification simplification**Proposal 18: Remove the following parameters from the UE demod PDSCH requirements and leave them up to implementation: − PDCCH configuration,  − CSI-RS for tracking,  − ZP CSI-RS.**PDSCH - PDSCH co-existence with LTE CRS**Proposal 19: Skip PDSCH cases for co-existence with LTE CRS.**PDCCH - Aggregation level**Proposal 20: Keep one PDCCH performance requirements selected by companies (such as 8), or include all PDCCH requirements with applicability rule with different aggregation level that any one PDCCH case has passed can be considered that all PDCCH cases are passed.**PDCCH - Test parameters specification simplification**Proposal 21: Remove the CSI-RS for tracking parameters from the UE demod PDCCH requirements and leave them up to implementation.**SDR - Inclusion of SDR requirements**Proposal 22: Do not include SDR requirements in IAB-MT demodulation.**CSI - Inclusion of CSI requirements**Proposal 23: Only keep CQI AWGN requirements for IAB MT.**CSI - CSI-RS resource type**Proposal 24: Only keep periodic NZP CSI-RS resource type for CQI/PMI/RI reporting cases.**CSI - CQI reporting granularity**Proposal 25: Only keep wideband CQI reporting granularity for CQI/PMI/RI reporting cases.**CSI - CQI/PMI/RI reporting type**Proposal 26: Only keep periodic CSI reporting type for CQI/PMI/RI reporting cases.**CSI - Test parameters specification simplification**Proposal 27: Remove the following parameters from CSI reporting requirements and leave them up to implementation: PDCCH configuration, CSI-RS for tracking, ZP CSI-RS.**CSI - CQI two tap channel model**Proposal 28: Skip two tap channel model for CQI test cases.**Interworking - Inclusion**Proposal 29: Skip LTE-NR coexistence/DC/etc. requirements.** |
| R4-2102097 | Nokia, Nokia Shanghai Bell | Tdoc Title: On NR IAB-MT testing setup and demodulation requirementsIAB-MT conformance testing setupObservation 1: An RMC can be represented as a succession of various FRCs. Leaving non-FRC slots, slots with T-RS, and special slots unallocated does not impact the measure performance in a meaningful way.Observation 2: It is agreed that the IAB node can also treat RAT-independent sources as a separate synchronization source. Fine time synchronization can be provided to the IAB-MT from the GNSS based PRTC with a necessary level of accuracy. Reasonably small time offsets (less than a CP) can be tolerated using only DMRS without meaningful impact on the demodulation performance.**Proposal 1: Consider IAB-MT as a part of a network node with test setup and performance requirements based on the BS approach. Apply the following principles for IAB-MT BS-style testing: a. TE definition is based on the assumption of using a signal generator b. IAB-MT shall be in a L1/L2 testing mode with an established RRC configuration c. Uni-directional Uu interface shall be used d. Testing is based on FRC definitions.** Moderator: Captured in “General” **e. HARQ feedback shall be provided from IAB-MT to the TE via an error-free link f. An external synchronization source for the TE and DUT is assumed**Observation 3: All of the proposed BS-style testing setup principles can also be implemented using the UE-style test setup. Observation 4: Optional provisions for sending reference signals can be made as a note in the FRC description. Observation 5: It is advantageous to standardize on a single realization of the test setup, and functionally equivalent implementations of the setup are not precluded.PDSCH - Propagation conditionsObservation 6: Down-scoping of TDLC300-100 propagation conditions in FR1 and TDLA30-300 in FR2 will result in insufficient test coverage.**Proposal 2: Keep propagation conditions TDLC300-100 in FR1 and TDLA30-300 in FR2.**PDSCH - MCS and Mapping typeObservation 7: FR1 PDSCH requirements for rank 3 and rank 4 transmission are only available for 16QAM.**Proposal 3: Include 16QAM in PDSCH requirements.**Observation 8: Mapping type B testing is already excluded by the previous decision to not test QPSK.PDSCH - Advanced test cases**Proposal 4: Do not include PDSCH cases for enhanced receiver Type 1, as this feature is of little interest to IAB-MTs.****Proposal 5: Do not include PDSCH cases for CSI-RS overlapped with PDSCH, as this is not a commonly required configuration in Rel-16 IAB.**PDSCH co-existence with LTE CRSNo opinionPDSCH - Impact of various configurations on testingObservation 9: If optimal synchronization is assumed, there is not meaningful difference between running the test configured in UE demod with or without T-RS/SSB.**Proposal 6: Do not specify the following parameters in IAB-MT PDSCH test configurations and leave them up to implementation: a. SSB, b. PDCCH configuration,  c. CSI-RS for tracking, d. ZP CSI-RS.**Observation 10: There is no meaningful difference between running the test configured in UE demod with or without data present in special slots.**Proposal 7: Give the TDD pattern assumed by the RMC/FRC for simulation in the PDSCH configuration table. Add a note that makes the requirements applicable to all TDD patterns chosen for testing (similar to BS demodulation specification).** [Moderator]: Merged into “General” section.PDCCH - Aggregation level**Proposal 8: Include all TDD PDCCH requirements except for AL 16.**PDCCH - Propagation conditions**Proposal 9: RAN4 to not down-select requirements for PDCCH from UE demod due to propagation conditions.**PDCCH - Test coverage of SCSObservation 11: Following the agreement of not specifying FDD requirements, it is unclear if 15kHz SCS PDCCH FDD requirements can be re-used in IAB-MT, or if it is required to have 15kHz SCS PDCCH requirement at all.PDCCH - Impact of various configurations on testing**Proposal 10: Add the T-RS configuration assumed by the RMC/FRC for simulation in the PDCCH configuration table. Add a note to the RMC/FRC that it is up to test setup and test implementation if the T-RS is transmitted and/or demodulated.**PBCH **Proposal 11: Re-use and test the TDD UE demodulation minimum performance requirements for the case of “SS/PBCH block index is known”. Skip the cases of unknown index.**SDR Observation 12: SDR testing required L3/PDCP data loopback functionality in the TE.**Proposal 12: Do not use the data loopback test function and consequently do not specify SDR tests for IAB-MT.**CSI - Resource and report type**Proposal 13: Limit requirements to only include periodic NZP CSI-RS and reporting.****Proposal 14: Limit CSI reporting requirements to reporting of CQI only.**CSI - CQI reporting**Proposal 15: It is sufficient to limit requirements for CQI reporting to the wideband case.****Proposal 16: Limit the propagation conditions in CQI reporting to re-use AWGN.****Proposal 17: Limit the propagation conditions in CQI reporting to re-use AWGN and TDLA.**CSI - Impact of various configurations on testing**Proposal 18: Do not specify a PDCCH configuration for CSI reporting testing.****Proposal 19: Do not specify ZP CSI-RS configuration for CSI reporting testing.****Proposal 20: Give the TDD pattern assumed by the RMC/FRC for simulation in the CSI reporting configuration table. Add a note that makes the requirements applicable to all TDD patterns chosen for testing (similar to BS demodulation specification).****Proposal 21: Give the T-RS configuration assumed by the RMC/FRC for simulation in the CSI reporting configuration table. Add a note to the RMC/FRC that it is up to test setup and test implementation if the T-RS is transmitted and/or demodulated.**Interworking requirements**Proposal 22: If interworking requirements are agreed to be included, all agreements taken on channels and features outside the interworking context, also apply to the interworking requirements.****Proposal 23: Do not re-use the interworking requirements for the IAB-MT requirement specification.** |
| R4-2102107 | Ericsson | Tdoc Title: IAB demodulation MT considerationsGeneral - FRC and reference signals**Proposal 1: IAB-MT demodulation requirements are defined based on single-slot FRCs****Proposal 2: No need to specify SSB, TRS, CSI-RS in the test parameters and FRCs, but configurations can be defined, and they can be transmitted if deemed needed during the test by the IAB manufacturer.**PDSCH - MCS**Proposal 3: Include requirements for PDSCH with 16QAM, at least for the local area IAB-MT.**PDSCH - Mapping**Proposal 4: Define requirements for PDSCH mapping type A only.**PDSCH - Remaining requirements**Proposal 5: Support for Enhanced Type 1 receiver, CSI-RS overlapping PDSCH and CRS rate matching should be declared.**PDCCH - Aggregation level**Proposal 6: For PDCCH, either (i) include only AL4 and AL8 with 1Tx/2Tx or (ii) include all UE tests.**PDCCH - CSI-RS**Proposal 7: No need to transmit CSI-RS, but configurations can be defined, and they can be transmitted if deemed needed during the test by the IAB manufacturer.**SDR**Proposal 8: Do not include SDR requirements for the IAB-MT**CSI - CQI**Proposal 9: For FR1 CQI, use periodic reporting for both the AWGN and the wideband fading CQI requirements.****Proposal 10: For FR2 CQI, use periodic AWGN and wideband aperiodic CQI requirements.**CSI - PMI**Proposal 11: For PMI, re-use UE requirements.**CSI - RI**Proposal 12: For RI, re-use UE requirements** |

## Open issues summary and views’ collection for 1st round

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

*Interested companies are expected to add their views directly under the respective issues in a dialogue-like form, i.e., identical to how the chair would record views during a f2f meeting.*

*Please add further table rows as required and do not change previous comments of your company or other companies. Answering to questions from other companies is encouraged.*

### Sub-topic 3-1: Conformance testing setup

*Sub-topic description:*

Prior agreements (R4-2017673)

* Conformance testing setup
	+ Left up to implementation on how L1/L2 is configured for testing
	+ Detailed test setup:
		- Use a test setup that offers the alternative options for testing with a unidirectional (BS like approach) or bidirectional (UE like approach) Uu interface between TE and IAB-MT. The DUT being allowed to knowingly be in a L1/L2 test mode configured using RRC or alternative propriety means and using TDD pattern independent FRC-like requirements to describe the KPI relevant channel structure. **FFS** whether coarse or fine time synchronization can be provided via the digital feedback link from the tester or by a common (e.g., GNSS) source, or by Uu interface
		- unidirectional (BS like approach) means
			* TE to IAB-MT linkage： DL by Uu interface
			* IAB-MT to TE linkage： Not through Uu interface
		- bidirectional (UE like approach) means
			* TE to IAB-MT linkage： DL by Uu interface
			* IAB-MT to TE linkage： UL by Uu interface
		- Note: Companies can **further clarify** BS approach
	+ Questions on performance aspects
		- Q1: Which configurations of the Uu interface (i.e., channels and signals) are required for performance testing, that are not the channel/signal under test?
			* E.g., in PDSCH demodulation testing with TPUT KPI, is there a meaningful difference between running the test with T-RS/SSB as configured in UE demod, and using optimal synchronization without transmitting T-RS/SSB?
			* This question also partially encompasses enquiries and responses regarding the rationale behind the manifold proposals to remove test parameters from UE demod derived requirements.
	+ DUT placement reference point and orientation
		- Coordinate reference point and orientation of the IAB-MT under test is for manufacture declaration.
	+ DUT feedback
		- HARQ/RV feedback done via an error-free digital feedback, the feedback linkage to TE still **FFS**.
	+ KPI deriving entity
		- No need to be specified in the specification for KPI deriving entity.

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

**Issue 3-1-1: Basis for test setup**

* For information: Prior agreement from the IAB **RF** conformance session (R4-2017671)
	+ Using BS test structure to generate the test set-up including test configurations, test models, RF channels
* For information: GTW agreement on Jan 26th in thread [306] (Rel-16 NR IAB \***RF**\* conformance general and common issues)
	+ Issue 1-1-2: Two-way communication in IAB-MT tests
		- Agreement:
		- Two-way communication is not specified for RF conformance tests, specification shall not preclude DL signals to be used e.g. for timing and frequency reference purposes during the test.
		- Companies further work on the clarification notes to conformance specifications for topic 1-1.
	+ Issue 1-1-3: Description of connection/measurement setup in specification annex
		- Agreements: Option 1: Flexibility in connection / measurement setup is allowed by keeping the specified setup informative
* Proposals
	+ Option 1 (Huawei, Nokia): Consider IAB-MT as a part of a network node with test setup and performance requirements based on the BS approach.
	+ Option 2 (Nokia): TE definition is based on the assumption of using a signal generator.
	+ Option 3: Test setup and performance requirements based on the BS approach assumption, i.e., using a signal generator and assuming unidirectional Uu interface. Flexibility in connection/test setup is allowed by keeping the specified setup informative, e.g., to use bi-directional Uu links and system simulators, like in the UE approach.
* Recommended WF
	+ Collect further views in first round.
	+ [Updated moderator recommendation following **RF** conformance testing GtW and comments by Ericsson, Qualcomm and Nokia]
		- The agreements concerning the test setup taken in RF seem applicable as a compromise in demod as well.
		Please check, if option 3 is acceptable to all.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We support option 1; the IAB is a network node. |
| Qualcomm | We would want the test approach to permit the option of bi-directional link like in a UE test setup and a test equipment that emulates the parent node. |
| Nokia, Nokia Shanghai Bell | In the spirit of standardization, we should have one exact test setup in mind when taking decisions and writing the specification. Given that IAB-MTs are a part of the network and will re-use the BS testing facilities, the baseline of BS testing should be applied to IAB-MT. I.e. testing using a signal generator.Alternatively, functionally equivalent test setups/implementations should not be excluded, however the default standard to match is the lowest common denominator of testing using a signal generator.Hence, we propose to agree on Option 2, which encompasses Option 1. |
| Ericsson | OK with option 3 |

**Issue 3-1-2: Synchronization in test procedure**

* For information: GTW agreement on Jan 26th in thread [306] (Rel-16 NR IAB \***RF**\* conformance general and common issues)
	+ Issue 1-1-1: Synchronization
		- Agreement:
		- Using same BS approach (no detailed synchronization configuration in conformance specifications; meanwhile add a note in conformance specs to clarify (IAB-MT sync with IAB-DU with DL signal configuration not precluded).
* Proposals
	+ Option 1 (Ericsson): Write the test procedure such that coarse synchronization is not specified. (It can be achieved by transmitting and detecting SSB or via proprietary means).
	+ Option 2 (Huawei, Nokia): Synchronization provided via the digital feedback link from the tester or by a common (e.g., GNSS) source.
	+ Option 3: Write the test procedure using the BS approach, i.e., no detailed synchronization configuration for coarse synchronization is included in conformance specifications.
	Add a note in conformance specifications to clarify that IAB-MT synchronization with the TE is left to implementation, i.e., neither the use of DL signal configuration nor the use of proprietary means is precluded.
* Recommended WF
	+ It is the moderator’s understanding that option 1 and 2 differ in the way that the synchronization procedure is captured in the specification.
	Please discuss in first round and see, if alignment is possible.
	+ [Updated moderator recommendation following **RF** conformance testing GtW and comments by Ericsson, Qualcomm and Nokia]
		- The agreements concerning the test setup taken in RF seem applicable as a compromise in demod as well.
		Please check, if option 3 is acceptable to all.

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| **Company** | **Comments** |
| Ericsson | We should take care that the specification is not restrictive. Option 2 is generally OK; it would be more general if it would state “**to or** from the tester”. |
| Qualcomm | Option 1 (Ericsson) is agreeable. More specifically, the test setup should permit both proprietary means, such as digital feedback or common source, and also Uu based methods, such as SSB transmission. To this end, the test procedure can either not specify the method of coarse synchronization, or it can specify that coarse synchronization can be achieved by proprietary means or via SSB, etc. |
| Nokia, Nokia Shanghai Bell | In our opinion, it is important to capture in the specification that TE and DUT are in synch. In our understanding, a common synchronization source shall be present in the system in any case. Hence, we agree with a comment from Ericsson. |
| Ericsson | OK with option 3 |

**Issue 3-1-3: Synchronization configuration**

* Proposals
	+ Option 1 (Ericsson): Proposal 3: Provide DM-RS for fine synchronization. Optionally, TRS can also be transmitted during the test for fine synchronization.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Collect further views in first round.

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| **Company** | **Comments** |
| Qualcomm | Option 1 (Ericsson) is agreeable. |
| Nokia, Nokia Shanghai Bell | In our opinion, there is no need to specify specifically that fine synchronization is achieved based on reference signals. DM-RS signals are always present in FRCs, and in our contribution we demonstrate that the time offsets on the level of CP do not have any significant impact on demodulation performance. |
| Ericsson | We do not plan to specify how the DM-RS is used. DM-RS will be included in the configuration and TRS optionally transmitted and implicitly it/they is/are then available for fine synchronization. |

**Issue 3-1-4: HARQ Feedback**

* Proposals
	+ Option 1 (Ericsson): Do not specify how HARQ feedback is sent to the TE. (It could be via Uu or via proprietary means).
	+ Option 2 (Nokia): HARQ feedback shall be provided from IAB-MT to the TE via an error-free link. Unidirectional Uu interface shall be used.
* Recommended WF
	+ Collect further views in first round.

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| **Company** | **Comments** |
| Ericsson | Our understanding is that option 1 and the first sentence of option 2 are basically the same except that option 1 would include the possibility of a non-error free link (which would not make sense). Perhaps option 2 could be worded as “HARQ feedback shall be provided from IAB-MT to the TE via an error-free link; the means by which the link is achieved is not specified” |
| Qualcomm | Option 1 (Ericsson) is agreeable. The test procedure should permit any of (i) a clean Uu based feedback from IAB-MT to test equipment, and (ii) proprietary means of feedback. To this end, the test procedure can either not specify the method of feedback, or it can indicate that both propriatery means, and clean Uu-based feedback are permitted. |
| Nokia, Nokia Shanghai Bell | We still see it important to specify specifically that HARQ feedback is provided over error-free link. Moreover, as we follow the BS approach in IAB-MT testing as a baseline, unidirectional Uu interface shall be used. Our preference is still slightly more on Option 2. |

**Issue 3-1-5: L1/L2 testing mode**

* Prior agreements (R4-2017673)
	+ Conformance testing setup
		- Left up to implementation on how L1/L2 is configured for testing
* Proposals
	+ Option 1 (Nokia): IAB-MT shall be in a L1/L2 testing mode with an established RRC configuration.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ It is the moderators understanding that the question of how a DUT receives L1/L2 configuration before testing was already agreed as “left up to implementation”.
	It is unclear if option 1 aims to change this agreement.

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| **Company** | **Comments** |
| Ericsson | We do not think that establishment of an RRC connection should be necessary; it is sufficient if the L1/L2 is active enough to do the PHY processing and measure the BLER etc. |
| Qualcomm | Option 1 (Nokia) is agreeable. |
| Nokia, Nokia Shanghai Bell | We agree that the exact way how L1/L2 testing mode and RRC configuration (if found to by needed in a particular realization) are established is up to implementation. We just wanted to emphasize that this shall be done before the actual performance test is started.We can proceed with the prior agreement. |

### Sub-topic 3-2: General

*Sub-topic description*

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

**Issue 3-2-1: Reference channels**

* Proposals
	+ Option 1 (Ericsson, Nokia): Demodulation requirements are defined based on single-slot FRCs.
	+ Option 2 (Huawei): PDSCH is scheduled only on ‘D’ slots without CSI-RS resource (include TRS) allocated.
* Recommended WF
	+ All received proposals request the use of BS-like FRCs instead of RMCs.
	Discuss in first round. It is recommended to try and align option 1 and 2.

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| **Company** | **Comments** |
| Ericsson | As well as option 1, we also agree with option 2 in general. What does the (include TRS) in parentheses mean though ? That the PDSCH FRC includes TRS ? |
| Nokia, Nokia Shanghai Bell | In general, there is no contradiction between Options 1 and Options 2, if multiple FRC types per test are specified (see Figure 1 in our contribution R4-2102097 for details).However, the results of the simulations, also presented in the same contribution, demonstrate that in the tests typical for IAB-MT, TRS does not have meaningful impact on the PDSCH demodulation performance. Hence, it is sufficient to consider only full D slots (i.e. only one type of FRC). If in the future new scenarios are found, where TRS can have a significant impact, a new FRC type (e.g., D slot with TRS) can be added. |

**Issue 3-2-2: TDD pattern**

* Prior agreement (R4-2017673)
	+ FDD and TDD requirements
		- Do not specify FDD requirements.
* Proposals
	+ Option 1 (Huawei): Reuse default TDD UL-DL pattern from BS requirements for IAB MT requirements definition (15, 60, 120 kHz SCS: 3D1S1U, S=10D:2G:2U; 30 kHz SCS: 7D1S2U, S=6D:4G:4U) and the same requirements are applicable to FDD and TDD with different UL-DL patterns.
	The SNR of achieving PDSCH relative throughput (e.g. 70%) can be independent on the slot configuration.
	+ Option 2 (Nokia): For PDSCH and CSI reporting, give the TDD pattern assumed by the RMC/FRC for simulation in the PDSCH/CSI reporting configuration table. Add a note that makes the requirements applicable to all TDD patterns chosen for testing (similar to BS demodulation specification).
	+ Option 3: Other options not precluded.
* Recommended WF
	+ Discuss in first round.
	Can the proponents of option 1 comment on the inclusion of FDD, with respect the prior agreement?
	Can the proponents of option 2 comment on the applicability of observations outside PDSCH?

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| **Company** | **Comments** |
| Qualcomm | We prefer to keep all TDD patterns and requirements applicable to a normal UE. |
| Ericsson | An IAB-MT may have a different configuration to a UE. The important thing is that we specify that the requirements apply for all TDD configurations. |

**Issue 3-2-3: Reference signals in test parameters and reference channels**

* Proposals
	+ Option 1 (Ericsson): No need to specify SSB, TRS, CSI-RS in the test parameters and FRCs, but configurations can be defined, and they can be transmitted if deemed needed during the test by the IAB manufacturer.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Discuss in first round.
	Similar proposals exist limited to certain channels/signals in the respective subsections.
	Discussions will be merged or separated based on first round progress.

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| **Company** | **Comments** |
|  Nokia, Nokia Shanghai Bell | Based on our simulation results reported in [R4-2102097], we do not see a need to specify SSB, TRS, and CSI-RS. Moreover, FRC-based requirements do not generally prohibit sending additional non-FRC slots that can include, for example, SSB or CSI-RS. If found to be needed, configurations for SSB, TRS, CSI-RS can be defined, but we do not see a strong reasons for that. |

**Issue 3-2-4: Down scoping and changing of propagation conditions**

* Prior agreements (R4-2017673)
	+ High speed scenarios
		- Skip test cases that are related to high speed scenario such as cases with TDLB100-400 Low, TDLC300-100 Low, HST for FR1 and TDLC60-300 Low, TDLA30-300 Low for FR2.
* Proposals
	+ Option 1 (Nokia): Keep propagation conditions TDLC300-100 in FR1 and TDLA30-300 in FR2. Thus, changing the prior agreement as follows:
	Skip test cases that are related to high speed scenario such as cases with TDLB100-400 Low, ~~TDLC300-100 Low~~, HST for FR1 and TDLC60-300 Low, ~~TDLA30-300 Low~~ for FR2.
	+ Option 2 (Huawei): Only define cases with propagation condition of TDLA30-10 for FR1 and TDLA30-75 for FR2. Only define cases with low antenna correlation.
	Re-simulate cases that propagation condition and/or antenna correlation is changed
* Recommended WF
	+ Two companies have expressed concerns about the test coverage, given the prior agreements.
	Please discuss/comment in first round, if the prior agreement is to be kept or needs to be changed; and how to change.
	Note that the prior agreement specifically mentioned the “low” correlation variants of the propagation conditions. There are also “med” and “high variants that were not discussed or agreed (e.g., TDLA30-300 med in FR2 PDSCH rank 1). The prior agreement might need to be adjusted to capture independence of correlation.

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| **Company** | **Comments** |
| Ericsson | We understand the desire to use the TDLA30-75 channel for all requirements. Being pragmatic though, including TDLC300-100 and TDLA30-300 would probably not cause an unnecessary change in implementations to meet, but would avoid the need for further simulations. So we have some preference to take the pragmatic approach of keeping TDLC300-100 and TDLA30-300 to avoid the need for new simulations. |
| Nokia, Nokia Shanghai Bell | Down-scoping of TDLC300-100 propagation conditions in FR1 and TDLA30-300 in FR2 will result in insufficient test coverage. Additionally, representative enough simulation campaign for new channels may not be possible with the current number of contributing companies.For these reasons, we proposed Option 1. |

**Issue 3-2-5: Basis for requirement re-use**

* Prior agreements (R4-2017673)
	+ Use Rel-15 UE demodulation requirements as a basis for requirement development.
	+ FFS:
		- Option 1: Define IAB MT performance requirements solely based on Rel-15 UE performance requirements. Configurations cannot be changed, only removed.
		- Option 2: Define IAB MT performance requirements based on Rel-15 UE performance requirements; Rel-16 requirements can be added according to operator request. Configurations cannot be changed, only removed.
		- Option 3: Define IAB MT performance requirements as a strict down selection from Rel-15 and 16 UE performance requirements. Only channel models can be changed.
		- Option 4: Define IAB MT performance requirements solely based on Rel-15 UE performance requirements. Test cases can be further down selection, the related test configurations (in test parameter table) can be further discussed to remove or update. Configurations (in minimum performance table) cannot be changed, only removed.
* Proposals
	+ Option 1 (Huawei): Define IAB MT performance requirements solely based on Rel-15 UE performance requirements. Test cases can be further down selection, configurations which has no influence on performance can be further discussed to kept or removed; configurations which has influence on performance can be further discussed to changed, kept or removed.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ The first part of option 1 seems to be already covered by previous agreement.
	Discuss second part in first round.
	Please also comment, if it is necessary to make an agreement here to move forward.

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| **Company** | **Comments** |
| Ericsson | For the second part, we can discuss which configurations to keep/remove on a case by case basis. |
| Nokia, Nokia Shanghai Bell | Regarding the configurations which have influence on the performance, we would prefer to leave them unchanged as much as possible. |

**Issue 3-2-6: MT types and classes**

* Proposals
	+ Option 1 (Huawei): For most of cases, the same requirements apply for all classes. For other cases, if companies think applicability rule can be defined for different classes, discuss them case by case.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Discuss in first round.

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| **Company** | **Comments** |
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**Issue 3-2-7: Conducted and radiated testing**

* Proposals
	+ Option 1 (Huawei): Define applicability rule same as UE, i.e. the conducted minimum requirements specified in this specification shall be met in all applicable scenarios for FR1. The radiated minimum requirements specified in this specification shall be met in all applicable scenarios for FR2.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Discuss in first round.

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| **Company** | **Comments** |
| Ericsson | It is important to define 1-O radiated requirements; otherwise there is no point in having a 1-O IAB in the specification since connectors would need to be provided just to meet the demodulation requirement. It is trivial to define the OTA requirements; they are exactly the same as the conducted requirements.  |
| Nokia, Nokia Shanghai Bell | We agree with Ericsson that 1-O radiated requirements shall be defined. |

**Issue 3-2-8: MT nomenclature**

* Question
	+ (Moderator): Do IAB-MTs adhere to a similar nomenclature as BSs/IAB-DUs? I.e., does the description “Type 1-O MT” make sense in the specifications?
	TS 38.174 section 4.4.2 points toward the case of IAB MTs and DUs needing to be of the same *type*, but can be of different *class*.
	Type 1-O represents a worst case, where no radiated testing requirements are available for FR1 MTs. However, a Type 1-O DU is probably combined together with a Type 1-O MT, which would make testing of the full system challenging.
* Recommended WF
	+ Please check the question and comment, if this requires action.

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| **Company** | **Comments** |
| Ericsson | We do not see where is the challenge to test both DU and MT OTA. For demodulation performance, it should be the same test setup ? (Possibly the DUT may need rotating if there are different antennas; this is anyhow needed for other RF requirements that are based on multiple directions or TRP measurement) |

### Sub-topic 3-3: PDSCH

*Sub-topic description*

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

**Issue 3-3-1: MCS**

* Prior agreements (R4-2017673)
	+ MCS
		- QPSK shall not be tested.
		- 64QAM shall be tested
* Proposals
	+ Option 1 (Intel): 16QAM and 256QAM (FR1) shall be tested.
	+ Option 2 (Huawei): 16QAM and 256QAM (FR1) shall not be tested.
	+ Option 3 (Nokia, Ericsson): 16QAM shall be tested.
	+ Option 4 (Ericsson): 16QAM shall be tested, at least for local area IAB-MT.
* Recommended WF
	+ Discuss in first round.
	It is recommended that proponents of options 1, 2, and 4, check if a common option formulation is possible.

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| **Company** | **Comments** |
| Ericsson | Actually, 256QAM could be an important use case for IAB, since the backhaul link needs to have high spectral efficiency for the IAB to be useful. |

**Issue 3-3-2: Rel-16 MCS**

* Prior agreements (R4-2017673)
	+ Do not include Rel-16 UE demod requirements, i.e., the following (HST is excluded)
		- FR2 256 QAM
		- […]
* Proposals
	+ Option 1 (Intel): Further discuss 256QAM requirements for FR2 after completion of Rel-16 UE FR2 256QAM requirements definition.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Option 1 seems to overturn the prior agreement.
	Please discuss in first round. It is recommended to keep prior agreements.

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| **Company** | **Comments** |
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**Issue 3-3-3: Mapping type**

* Proposals
	+ Option 1 (Intel): Include requirements for mapping type A and B without applicability rules.
	+ Option 2 (Huawei, Ericsson): Only keep PDSCH performance requirements for mapping Type-A.
	+ Option 3 (Moderator): Only mapping type A has requirements based on prior agreement that QPSK is excluded from testing.
* Recommended WF
	+ Please verify, if option 3 is a correct observation, and comment in first round.

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| **Company** | **Comments** |
| Ericsson | Our understanding is also that with no QPSK only type A is defined in the UE specification. |
| Nokia, Nokia Shanghai Bell | Following our previous agreements, type B should not be tested because QPSK is used in the only present UE test. |

**Issue 3-3-4: PRB bundling size**

* Prior agreements (R4-2017673)
	+ PRB bundling size
		- Only keep requirements with PRB bundling size 2.
* Proposals
	+ Option 1 (Intel): Only keep requirements with wideband PRB bundling size and PRB bundling size 2.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Option 1 seems to be changing the prior agreement from “only 2” to “only 2 and WB”.
	Please discuss in first round.
	Note: PRB wideband bundling seems to be configured for TDD in one instance of PDSCH 16QAM Rank 3 TDLA30-10 Test 3-1 (TS 38.101-4 Table 5.2.3.2.1-5: Minimum performance for Rank 3).

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| **Company** | **Comments** |
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**Issue 3-3-5: Enhanced Receiver**

* Proposals
	+ Option 1 (Huawei, Nokia): Skip PDSCH cases for enhanced receiver Type 1.
	+ Option 2 (Intel, Ericsson): Include requirements for enhanced receiver Type 1 but allow to declare support of it.
* Recommended WF
	+ Please discuss in first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | Enhanced receivers are optional UE features and outperform normal receiver in interference rich scenarios. Firstly, for IAB-MT nodes we don’t see it necessary to incorporate optional UE features. Secondly, the IAB network node placement is planned and will take interference management into account.Hance, we prefer not to have requirements that have little use in IAB deployments (Option 1). |
| Ericsson | We can compromise to option 1. |

**Issue 3-3-6: Overlapped CSI-RS**

* Proposals
	+ Option 1 (Intel, Huawei, Nokia): Skip PDSCH cases for CSI-RS overlapped with PDSCH.
	+ Option 2 (Ericsson): Include requirements but allow to declare support.
* Recommended WF
	+ Please discuss in first round.

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| **Company** | **Comments** |
| Ericsson | We can compromise to option 1. |

**Issue 3-3-7: Co-existence with LTE CRS**

* Proposals
	+ Option 1 (Intel, Huawei): Skip PDSCH cases for co-existence with LTE CRS.
	+ Option 2 (Ericsson): Include requirements but allow to declare support.
* Recommended WF
	+ Please discuss in first round.

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| **Company** | **Comments** |
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**Issue 3-3-8: Test parameters specification simplification**

* Proposals
	+ Option 1 (Huawei): Remove the following parameters from the UE demod PDSCH requirements and leave them up to implementation:
		- PDCCH configuration,
		- CSI-RS for tracking,
		- ZP CSI-RS.
	+ Option 2 (Nokia): Do not specify the following parameters in IAB-MT PDSCH test configurations and leave them up to implementation:
		- SSB,
		- PDCCH configuration,
		- CSI-RS for tracking,
		- ZP CSI-RS.
* Recommended WF
	+ Please discuss in first round.
	Please clarify what “remove/not specify and leave up to implementation” means in terms of capturing in the specification.

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| **Company** | **Comments** |
| Ericsson | We think these can be transmitted if needed but do not have to be transmitted. We are OK not to specify them. |

### Sub-topic 3-4: PDCCH

*Sub-topic description*

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

**Issue 3-4-1: Aggregation Level**

* Proposals
	+ Option 1 (Intel, Ericsson): Include all PDCCH requirements and require IAB-MT to pass all of them.
	+ Option 2 (Huawei): Keep one PDCCH performance requirements selected by companies (such as 8), or include all PDCCH requirements with applicability rule with different aggregation level that any one PDCCH case has passed can be considered that all PDCCH cases are passed.
	+ Option 3 (Nokia): Include all TDD PDCCH requirements except for AL 16.
	+ Option 4 (Ericsson): Include only AL4 and AL8 with 1Tx/2Tx
* Recommended WF
	+ Discuss in first round.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | Looking at the list of existing PDCCH UE tests, we can observe that including only AL4 and AL8 will leave only one test per TX x RX combination. We have not found any tests with the number of TX different from 1 and 2. This makes Options 2 (second part) and 4 rather close. We can also agree with Option 4. |

**Issue 3-4-2: Test parameter specification simplification**

* Proposals
	+ Option 1 (Intel): Keep the CSI-RS for tracking parameters for IAB-MT node PDCCH test cases from the UE PDCCH performance requirements.
	+ Option 2 (Huawei): Remove the CSI-RS for tracking parameters from the UE demod PDCCH requirements and leave them up to implementation.
	+ Option 3 (Nokia): Add the T-RS configuration assumed by the RMC/FRC for simulation in the PDCCH configuration table. Add a note to the RMC/FRC that it is up to test setup and test implementation if the T-RS is transmitted and/or demodulated.
	+ Option 4 (Ericsson): No need to transmit CSI-RS, but configurations can be defined, and they can be transmitted if deemed needed during the test by the IAB manufacturer.
* Recommended WF
	+ Discuss in first round.
	The only difference between option 3 and 4 seems to be “T-RS” or “all CSI-RS”.

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | In our opinion, Options 3 and 4 can be joined. |

**Issue 3-4-3: Propagation condition**

* Proposals
	+ Option 1 (Nokia): Not down-select requirements for PDCCH from UE demod due to propagation conditions.
	+ Option 2: Other options not precluded.
* Recommended WF
	+ Discuss in first round.
	Overlap with the general discussion on propagation conditions.

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| **Company** | **Comments** |
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**Issue 3-4-4: Test coverage of SCS**

* Observation
	+ (Nokia): Following the agreement of not specifying FDD requirements, it is unclear if 15kHz SCS PDCCH FDD requirements can be re-used in IAB-MT, or if it is required to have 15kHz SCS PDCCH requirement at all
* Recommended WF
	+ Please be invited to check the observation and comment, if this requires action.

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| **Company** | **Comments** |
| Ericsson | We do not see any need to include 15kHz requirements as they are linked to FDD. |

### Sub-topic 3-5: PBCH

*Sub-topic description*

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

**Issue 3-5-1: Inclusion of PBCH**

* Proposals
	+ Option 1 (Intel): Reuse UE PBCH requirements for IAB-MT node.
	+ Option 2 (Huawei): Do not introduce PBCH requirements for IAB-MT.
	+ Option 3 (Nokia): Re-use and test the TDD UE demodulation minimum performance requirements for the case of “SS/PBCH block index is known”. Skip the cases of unknown index.
* Recommended WF
	+ Discuss in first round.

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| **Company** | **Comments** |
| Ericsson | Inclusion of PBCH is not essential. If it is included, support for PBCH detection should be declared, since it may be possible that an IAB can operate without detecting PBCH. |
| Nokia, Nokia Shanghai Bell | If the implementations without PBCH detections are foreseen by other companies then we agree on declaration. We still prefer to skip the cases of unknown index. |

### Sub-topic 3-6: SDR

*Sub-topic description*

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

**Issue 3-6-1: Inclusion**

* Proposals
	+ Option 1 (Ericsson, Nokia, Huawei): Do not include SDR requirements for the IAB-MT
* Recommended WF
	+ Option 1 seems agreeable; no counterproposals have been submitted.

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| **Company** | **Comments** |
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### Sub-topic 3-7: CSI Reporting

*Sub-topic description*

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

**Issue 3-7-1: Test parameter specification simplification**

* Proposals
	+ Option 1 (Intel): Do not remove the following parameters from CSI reporting requirements and leave them up to implementation: PDCCH configuration, CSI-RS for tracking, ZP CSI-RS.
	+ Option 2 (Nokia):
		- Do not specify a PDCCH and ZP CSI-RS configuration for CSI reporting testing.
		- Give the T-RS configuration assumed by the RMC/FRC for simulation in the CSI reporting configuration table. Add a note to the RMC/FRC that it is up to test setup and test implementation if the T-RS is transmitted and/or demodulated.
	+ Option 3 (Huawei): Remove the following parameters from CSI reporting requirements and leave them up to implementation: PDCCH configuration, CSI-RS for tracking, ZP CSI-RS.
* Recommended WF
	+ Collect further views in first round.
	+ Check, if compromises including “notes” or “optional tags” are feasible.

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| **Company** | **Comments** |
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**Issue 3-7-2: CQI inclusion**

* Proposals
	+ Option 1 (Intel): Reuse all CQI reporting test cases which were defined for TDD duplex mode for 4 Rx conducted and 2 Rx radiated requirements except conducted test case with sub-band CQI reporting granularity.
	+ Option 2 (Nokia): Limit CSI reporting requirements to reporting of CQI only
	+ Option 3 (Moderator): Include CQI reporting test cases, with limitations discussed in the following issues.
* Recommended WF
	+ Discuss in first round. Option 3 is recommended by the moderator.

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| **Company** | **Comments** |
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**Issue 3-7-3: CQI CSI-RS Resource type and report config**

* Proposals
	+ Option 1 (Ericsson):
		- For FR1, use periodic reporting for both AWGN and fading conditions.
		- For FR2, use periodic reporting for AWGN and aperiodic reporting for fading conditions.
	+ Option 2 (Huawei, Nokia): Limit requirements to only include periodic NZP CSI-RS and reporting.
* Recommended WF
	+ Please verify, if contradictions are present in proposals and collect further views in first round.

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| **Company** | **Comments** |
| Ericsson | Note that aperiodic reporting is only proposed for FR2 & fading because that is the only requirements available right now. Possibly the same requirements could be re-used but declared as periodic. |

**Issue 3-7-4: CQI reporting granularity**

* Proposals
	+ Option 1 (Ericsson):
		- For FR1, use wideband granularity for both AWGN and fading conditions.
		- For FR2, only wideband granularity requirements are defined.
	+ Option 2 (Huawei, Nokia, Intel): Limit requirements for CQI reporting to the wideband case.
* Recommended WF
	+ Option 1 and option 2 seem to be functionally identical.
	Confirm in first round and agreeable if no counter-opinions are received.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | The options seem to be the same |

**Issue 3-7-5: CQI propagation condition**

* Proposals
	+ Option 1 (Ericsson): Use both AWGN and fading conditions.
	+ Option 2 (Huawei, Nokia, Intel): Limit the propagation conditions in CQI reporting to re-use AWGN and TDLA, skip two tap channel.
	+ Option 3 (Huawei): Only keep CQI AWGN requirements.
* Moderator comment: Intel’s Tdoc makes the observation of “conducted test case with sub-band CQI reporting granularity” being 2 tap channel model, so the proposal on “CQI inclusion” is interpreted as supporting option 2 here. Please correct this understanding if needed.
* Recommended WF
	+ Discuss in first round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We are OK for option 2 on the basis that the backhaul link will most likely be LOS. |

**Issue 3-7-6: PMI inclusion**

* Proposals
	+ Option 1 (Ericsson): For PMI, re-use UE requirements.
	+ Option 2 (Intel): Reuse all PMI reporting test cases which were defined for TDD duplex mode for 4 Rx conducted and 2 Rx radiated requirements but change report configuration and CSI-RS resource type from aperiodic to periodic.
* Recommended WF
	+ Collect further views in first round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | OK to change aperiodic to periodic as long as it does not change the requirement. |
| Nokia, Nokia Shanghai Bell | We expect that the deployment of IAB functionality is not random but can leverage network planning to favour LOS conditions with stable link quality. In such stable radio environments, the usefulness of PMI is limited. Assuming a realistic test is devised, the PMI values would change very rarely and, thus, the overall performance metrics would barely show the difference between better and normal demodulation performance.We prefer not to include PMI requirements for IAB-MT. |

**Issue 3-7-7: PMI CSI-RS Resource type and report config**

* Proposals
	+ Option 1 (Intel): Change report configuration and CSI-RS resource type from aperiodic to periodic
	+ Option 2 (Huawei, Nokia): Limit requirements to only include periodic NZP CSI-RS and reporting.
* Recommended WF
	+ Collect further views in first round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | OK to change aperiodic to periodic as long as it does not change the requirement. |

**Issue 3-7-8: RI inclusion**

* Proposals
	+ Option 1 (Ericsson): For RI, re-use UE requirements.
	+ Option 2 (Intel): Reuse all RI reporting test cases which were defined for TDD duplex mode for 4 Rx conducted and 2 Rx radiated requirements but change report configuration and CSI-RS resource type from aperiodic to periodic.
* Recommended WF
	+ Collect further views in first round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | OK to change aperiodic to periodic as long as it does not change the requirement. |
| Nokia, Nokia Shanghai Bell | We expect that the deployment of IAB functionality is not random but can leverage network planning to favour LOS conditions with stable link quality. In such stable radio environments, the usefulness of RI is limited. Assuming a realistic test is devised, the RI values would change very rarely and, thus, the overall performance metrics would barely show the difference between better and normal demodulation performance. |

**Issue 3-7-9: RI CSI-RS Resource type and report config**

* Proposals
	+ Option 1 (Intel): Change report configuration and CSI-RS resource type from aperiodic to periodic
	+ Option 2 (Huawei, Nokia): Limit requirements to only include periodic NZP CSI-RS and reporting.
* Recommended WF
	+ Collect further views in first round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | OK to change aperiodic to periodic as long as it does not change the requirement. |

### Sub-topic 3-8: Interworking

*Sub-topic description*

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

**Issue 3-8-1: Interworking inclusion**

* Proposals
	+ Option 1 (Huawei, Nokia): Do not re-use the interworking requirements for the IAB-MT requirement specification.
	+ Option 2 (Nokia): If interworking requirements are agreed to be included, all agreements taken on channels and features outside the interworking context, also apply to the interworking requirements.
* Recommended WF
	+ Option 1 seems agreeable; no counterproposals submitted.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | It is not obvious that interworking is needed for the backhaul link in rel-16. |

### Sub-topic 3-9: Summary of requirement re-use (informative)

*Sub-topic description*

Using tables to track previously agreed and proposed main adaptations. Not all details are captured.
The agreements captured in the text of this summary document, as well as WFs, supersede the informative tables below.

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

Table: UE requirement re-use table - FR1 (Informative)
Previous state: End of RAN4#97-e

|  |  |  |
| --- | --- | --- |
| **Feature** | **Previous State** | **Adaptations** |
| Rel-15 |
| PDSCH | MCS: ~~4,~~ 13, 19, 24(Table2)Mapping Type A, Type BChannel: ~~TDLB100-400 Low, TDLC300-100 Low~~, TDLA30-10 Low, ~~HST-750, HST-1000,~~ TDLA30-10 **Med** (enhRX)Incl. ~~HARQ soft combining,~~Enhanced Receiver Type 1, CSI-RS overlapped with PDSCH,LTE-NR coexistence |   |
| PDCCH | Channel: TDLA30-10 Low, ~~TDLC300-100 Low~~, TDLA30-10 **Med** |   |
| PBCH | Channel: ~~TDLC300-100 Low~~, TDLA30-10 Low |   |
| SDR | Incl. CA |   |
| CQI | Channel: AWGN, TDLA30-5 **high**, Two tapReporting: wideband, sub-bandCSI-RS type: periodicReport type: periodic, aperiodic |   |
| PMI | Channel: TDLA30-5 **high**Reporting: widebandCSI-RS type: periodic, aperiodicReport type: aperiodic |   |
| RI | Channel: TDLA30-5 Low**/high**CSI-RS type: periodicReport type: periodic |   |
| Interworking | Subset of "verification in FR1" only |   |
| Rel-16 |
| ~~URLLC ultra-low BLER~~ |   |   |
| ~~URLLC high reliability~~ |   |   |
| ~~URLLC low latency~~ |   |   |

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

Table: UE requirement re-use table - FR2 (Informative)
Previous state: End of RAN4#97-e

|  |  |  |
| --- | --- | --- |
| **Feature** | **Previous State** | **Adaptations** |
| Rel-15 |
| PDSCH | MCS: ~~4,~~ 13, 17, 18Mapping Type AChannel: ~~TDLC60-300 Low~~, ~~TDLA30-300 Low~~**/Med**, TDLA30-75 LowIncl. ~~HARQ soft combining,~~Enhanced Receiver Type 1 |   |
| PDCCH | Channel: TDLA30-75 Low, ~~TDLA30-300 Low~~ |   |
| PBCH | Channel: TDLA30-75 Low, ~~TDLA30-300 Low~~ |   |
| SDR | Incl. CA |   |
| CQI | Channel: AWGN, TDLA30-35 **high**Reporting: widebandCSI-RS type: periodic, aperiodicReport type: periodic, aperiodic |   |
| PMI | Channel: TDLA30-35 LowReporting: widebandCSI-RS type: periodic, aperiodicReport type: aperiodic |   |
| RI | Channel: TDLA30-35 Low**/high**CSI-RS type: periodic, aperiodicReport type: aperiodic |   |
| Interworking | Subset of "verification in FR2" only |   |
| Rel-16 |
| ~~256 QAM~~ |   |   |
| ~~URLLC high reliability~~ |   |   |
| ~~URLLC low latency~~ |   |   |

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

### Sub-topic 3-10: Other

*Sub-topic description:*

*In this sub-topic companies are invited to bring issues to the attention of the group, which have not been captured in the previous sub-topics.*

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

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Title, Source |
| Company A |
| Company B |
|  |
|  | Moderator: No CRs/TPs/etc. |
|  |
|  |
|  |

## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

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

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