**3GPP TSG-RAN WG4 Meeting # 98-e R4-200XXXX**

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

**Agenda item:** 7.4.3.3, 7.4.3.4

**Source:** Moderator (Samsung)

**Title:** Email discussion summary for [98e][307] NR\_IAB\_Conformance\_Part2

**Document for:** Information

# Introduction

This thread is assigned to cover Rel-16 NR IAB RF conducted and radiated conformance testing except the general aspects and common issues.

According to contributions submitted under related agendas, the summary is divided in topics as below:

* Topic#1: Dynamic range, Power control and Frequency error for IAB-MT
* Topic#2: Possibility to control test burden

The contributions submitted under agenda 7.4.3.3 and 7.4.3.4 on common issues such as test set-up, MU/TT, declaration, etc will be summarized in [306] except the dedicated proposals on two topics above. Furthermore, the TP attached in the contribution will not be treated at least in 1st round discussion.

# Topic #1: Dynamic range, power control and frequency error for IAB-MT

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

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2100370**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100370.zip) | CATT | For dynamic range test,**Observation 1: For test point [1], both testing it by following BS approach or being covered by maximum output power test can guarantee the performance.****Observation 2: Test point 2 can be omitted if EVM test covers this point.****Observation 3: Test point 3 needs to be tested. 1 RB can be tested for local area IAB-MT and [5] RB can be tested for wide area IAB-MT.****Observation 4: Test point 4 can be omitted.****Observation 5: Partial RB with maximum output power test case is not needed for wide area IAB-MT, but testing this scenario for local area IAB-MT can bring benefit for network deployment.**For frequency error test,**Observation 6: For the frequency error test, the connection between TE and IAB-MT can follow UE approach.****Observation 7: Test configuration for frequency error can follow BS approach.****Observation 8: The test parameters, initial connection with TE and test procedure can follow UE approach.**For power control test,**Proposal: IAB-MT power control requirement is not tested in R16, if it’s tested in future releases FFS.** |
| [**R4-2101418**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101418.zip) | Qualcomm Incorporated | Proposed tests for dynamic range:1. Maximum output power with full RB allocation
2. Maximum output power with 1/4 RB allocation
3. Minimum output power (as set by 5/10 dB dynamic range requirement) with full RB allocation.

Proposal for power control test:* Use full RB allocation for the power control allocation
* Power should be varied between minimum and maximum with the smaller steps(+/- 2dB)
* Use two way setup for the test in which DUT follows the TE commands

Proposal for the Frequency error test:* Use two way setup
* Reuse the UE test environment in terms of reference channels and signal levels
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| [**R4-2102013**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102013.zip) | Nokia, Nokia Shanghai Bell | **Observation 1: It has been agreed that dynamic range requirements require maximum of 5 or 10 dB PSD variation depending on IAB-MT class when channel is fully allocated.****Observation 2: It has been agreed that single RB transmission requirement uses the same PSD as full RB transmissions.** **Observation 3: Testing maximum output power with narrow PRB allocation has not been agreed and shall not be done.****Proposal 1: Adopt the two following test points for dynamic range test:****1) Maximum output power with full RB allocation and maximum output power****2) single RB allocation with 5/10 dB lower PSD as used in test point 1)****Observation 4: There is an opportunity to re-use maximum output power test result for single carrier for test point 1)** |
| [**R4-2102327**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102327.zip) | Ericsson | **Observation-1: Power control requirement rely on TX dynamic range to provide the output power adjustability.****Observation-2: Power control requirement allow the TX output power uncertainty due to the TX gain setting change**.**Observation-3: Power control requirement allow the TX output power uncertainty due to the TX gain setting change** **while not allowing such uncertainty for DR will overdrive the design without benefiting the system performance**.**Proposal-4: consider the power output inaccuracy due to the TX gain setting change in TX dynamic change test.****Observation-4: Power control test case cover the TX DR case if the similar power pattern as UE test case is introduced.****Proposal-5: Test model design need to cover the case where less # of RB could be configured for power control testing case.** |
| [**R4-2102330**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102330.zip) | Ericsson |  **Figure 1 : DUT and TE using the external synch reference (a) or DUT generated sync reference (b) for RF TX testing****Proposal-1: Use the Figure 1 test setup as one alternative for the IAB-MT frequency error test setup when BS test equipment is used.** |
| [**R4-2102335**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102335.zip) | Ericsson | **Proposal-1: modify the TX dynamic range reference condition with full RB transmission in core specification.****Observation-1: Power control requirement rely on TX dynamic range to provide the output power adjustability.****Observation-2: Power control requirement allow the TX output power uncertainty due to the TX gain setting change**.**Proposal-2: consider the power output inaccuracy due to the TX gain setting change in TX dynamic change test.** |

## Open issues summary

Last meeting the WF on dynamic range, power control (LA) and frequency error for IAB-MT agreed in R4-2017490 as below. Based on this contributions are provided to resolve the remaining issues for this meeting.

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| --- |
| 2.1 WF on dynamic range test**Agreement**: RAN4 will introduce conformance test cases for dynamic range requirements for both wide-area and local-area IAB-MT classes.* RAN4 will further discuss the uncertainty impact on the feasibility of introducing test case

The following test points were identified as candidates in RAN4#97e and they will be down selected in next RAN4 meeting and should be reviewed based on agreement on updated DR requirement if any* [1] Maximum output power with full RB allocation.
* [2] Minimum output power (as set by 5/10 dB dynamic range requirement) with full RB allocation.
* [3] Narrow RB allocation with the same PSD as [2].
* [4] Partial RB allocation with same PSD as [1].
* Others proposals, for example maximum output power with partial RB allocation, if any reasonable justifications

The following aspects will be considered/decided when the test points are concluded.* The reference side condition agreed in R4-2008775.
* If some test point can be covered by other requirements.
* The typical scenarios of IAB-MT backhaul function.
* The exact RB number for narrow/partial RB allocation based on reference condition definition in core requirements
* Whether test point set/combination for dynamic range is different for Wide Area and Local Area IAB-MT
* Others if any.

2.2 WF on power control test for Local Area IAB-MT**Agreement**: Dynamic range and power control tests are defined separately. * Further discussion on test applicable rules among these test cases is not excluded.

For relative power accuracy test,* The smallest power control step size is considered.
* The followings will be discussed in next meeting.
	+ How to accommodate this test with the test set-up structure.
		- If two way signal is necessary.(this also relates to the generic test setup discussion)
	+ Power control step size, RB allocation, etc.

2.3 WF on frequency error testThe following will be discussed in next meeting* How to accommodate this test with the test set-up structure to be agreed for IAB-MT test environment setup
	+ If two way signal is necessary.
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### Sub-topic 1-1: Dynamic range

R4-2102335 proposed to revise the reference condition for TX dynamic range as “**full RB allocation**” in core specification and take into account “**power output inaccuracy due to the TX gain setting change in TX dynamic change test** “

R4-2100370 provided observations that Test point 1 and Test point 3 are needed for dynamic range. Test point 2 can be removed if covered by EVM testing. Furthermore test condition on partial RB allocation with maximum output power may be benefit for Local Area IAB-MT.

R4-2102013 suggested to take two test points as below for dynamic range:

1) Maximum output power with full RB allocation and maximum output power(Test point 1 in WF)

2) single RB allocation with 5/10 dB lower PSD as used in test point 1) (Updated Test point 3 in WF)

R4-2101418 proposed the test point as below:

* Maximum output power with full RB allocation(Test point 1 in WF)
* Maximum output power with 1/4 RB allocation(belongs other proposal in WF)
* Minimum output power (as set by 5/10 dB dynamic range requirement) with full RB allocation.(Test point 2 in WF)

Furthermore, several contribution share the similar understanding that test point 1 can be covered by total output power test

**Issue 1-1: Test point**

* Proposals
	+ Option 1:Consider two test points for IAB-MT dynamic range as below:
	+ Maximum output power with full RB allocation and maximum output power(Test point 1 in last meeting WF)
	+ single RB allocation with 5/10 dB lower PSD as used in test point 1) (Updated Test point 3 in last meeting WF)
	+ Option 2: consider dynamic range on full RB allocation only and update core requirement
	+ Option 3:
	+ Maximum output power with full RB allocation(Test point 1 in WF)
	+ Maximum output power with 1/4 RB allocation(belongs other proposal in WF)
	+ Minimum output power (as set by 5/10 dB dynamic range requirement) with full RB allocation.(Test point 2 in WF)
* Recommended WF
	+ It’s encouraged companies share preference on the options on test points selection. And it would be appreciated if companies can share opinion on whether Dynamic PSD(X) and constant PSD(Y) we agreed last year should be applied for IAB-MT.

***[Discussion and tentative agreement during 26th Jan GTW meeting]:***

Both X and Y need to be covered in conformance test cases

Option 1(Samsung, Nokia, CATT, ZTE):

* Test points 1: Maximum output power with full RB allocation and maximum output power
* Test points 2: single RB allocation with 5/10 dB lower PSD as used in test point 1)
* Test point 1- test point 2 = X+Y （+/- uncertainty FFS ）

Option 2 (E///, ZTE):

* Test points 1: Maximum output power with full RB allocation and maximum output power
* Test points 3: Minimum output power (as set by 5/10 dB dynamic range requirement) with full RB allocation.
* Test point 4: Sing PRB transmission with same PSD as test point 1
* Test point 1- test point3 = X (+/- uncertainty FFS)
* Test point 1 – test point4 =Y (+/- uncertainty FFS)

FFS for test applicability among with other conformance requirements

Candidate agreements: Option 1 pending on further check by E/// and make decision in this meeting.

E///: Power accuracy need to be considered. Y can be considered to be verified in power control requirements.

Nokia: Prefer option 1, we can follow majority among option 1 and option2. Not prefer to merger test cases with power control requirements.

Samsung: We prefer option 1 considering test burden, power control only defined for local-IAB-MT, prefer not to merge them together.

ZTE: The power control requirements not applicable for dynamic range requirements.

E///: We prefer option 2.

### Sub-topic 1-2: Power control for Local Area IAB-MT

R4-2100370 suggested to postpone the definition on conformance testing requirement for power control on Local Area IAB-MT.

R4-2102327 proposed to power control cover DR case and the test model design should consider the partial RB allocation case.
 =>It seems this imply the partial RB allocation case is suggested dedicatedly for Local Area IAB-MT since power control is only applied for Local Area IAB-MT.

R4-2101418 suggested as below

* Use full RB allocation for the power control allocation
* Power should be varied between minimum and maximum with the smaller steps(+/- 2dB)
* Use two way setup for the test in which DUT follows the TE commands

=>In UE testing on the relative power tolerance is verified by update on RB allocation together with +/-1dB TPC command. If it is the common understanding that the frequency re-allocation is not so frequently whether it is possible to take this into account of test point for dynamic range?

**Issue 1-2-1: Power control test points**

Proposals

* + Option 1: No specific test for this requirement but can be verified implicitly by other requirement
	+ Option 2: To be verified by below configuration
	+ Use full RB allocation for the power control allocation
	+ Power should be varied between minimum and maximum with the smaller steps(+/- 2dB)
	+ Option 3: Partial PRB allocation to be considered in Test model design if to reuse the similar test configuration as UE.
* Recommended WF
	+ Even though we agreed to define power control and power dynamic range separately in last meeting, it seems the proposal on each requirement are still related to each other. Hence it would be appreciated if each company can provide feedback on both requirement with whole picture consideration.

**Issue 1-2-2: Test set-up**

Proposals

* + Option 1: follow BS approach to define limited parameter to ensure the flexibility
	+ Option 2: Use two way setup for the test in which DUT follows the TE commands
* Recommended WF
	+ TBA

### Sub-topic 1-3: Frequency error

R4-2100370 the suggestion is that except Test configuration can follow BS approach remaining aspect including set-up should follow UE approach.

R4-2101418 suggested that for IAB-MT frequency error all UE parameter such as two way signal and environment should be reused.

R4-2102330 proposed to allow the alternative solution to measure the IAB-MT frequency error with BS test equipment with external synch reference or DUT generated sync reference.

* It seems RAN4 should clarify whether the frequency error of IAB-MT can be verified together with EVM as BS.

**Issue 1-3: frequency error**

* Proposals
	+ Option 1: Verification can be done together with EVM and allow the alternative to apply BS test equipment
	+ Option 2: Verify by UE approach including test set-up and test environment.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |
| CATT | **Issue 1-1: Test point** We prefer option 1 combined with one of the test points (Maximum output power with 1/4 RB allocation(belongs other proposal in WF)) in option 3 if it can be agreed. For local area MT, maximum output power with small RBs is a real scenario for the deployment. However, we don’t intend to reverse the agreed WF last year even though it’s not reasonable according to our current understanding.**Issue 1-2-1: Power control test points** We don’t have strong opinion on this test as the dynamic range is so small.**Issue 1-2-2: Test set-up**If it’s tested, we think IAB-MT needs to understand parent node’s command of power control, so seems two-way set up is necessary.**Issue 1-3: frequency error**We still prefer option 2 as this requirement is defined as relative frequency accuracy. And we have a clarification question that if option 1 is agreed, how to handle the implementation related to option 2. We’re not sure if RF part should consider forward compatibility for R17 IAB. If option 1 is adopted, some modifications for R17 may be needed. |
| Ericsson | **Issue 1-1: Option 2. Our understanding is that the 5/10 dB requirements is for Dynamic PSD (X), not the constant PSD (Y). For PSD (Y), our understanding is that we do not define the requirement but could be tested in conformance test. Though as the reference condition in current specification not specified in detail so there is possibility we could even test the Contant PSD (Y) within the Tx dynamic range, we think it is not a neat way to do so as the requirement itself is 5/10 dB which against the whole working constant PSD (Y) range of 10log10(max #RB). We suggest to testing it within the power control tolerance requirement as the same as the legacy UE conformance testing. So we do not miss the test coverage of Y by following UE approach. Though the power control requirement test itself could be further simplified.****The complication for TX dynamic range is that we need also consider the output power inaccuracy so not to overdrive the design. Unfortunately this point is missed in the option available for issue 1-1 but mentioned as a general point in the moderator summary in issue 1-1. We could discuss it in the GTW session. Our opinion is that this output power inaccuracy could be considered together with the test point definition in conformance testing.** **Issue 1-2-1: Option 3. As explained above, the PSD (Y) test points could be defined in power control test. Our opinion is that even though UE approach could be followed, the test itself could be further simplified considering the Tx dynamic range test already covers the full RB allocation case.** **We also support the moderator view that the Tx dynamic range also could be tested within the Tx dynamic range. In this way the output power inaccuracy would be automatic considered.** **Issue 1-2-2: Option 1, this is generic issue and should follow and apply the generic approach to specific test.****Issue 1-3: Option 1. The frequency error test is done within the EVM test (BS) and in channel Tx test. Our view is that allowing BS EVM&frequency error test not excluding the UE EVM/freqeucy error test.** |
| Nokia, Nokia Shanghai Bell | Sub topic 1-1: Our first preference is option 1, as it covers testing dynamic range both in PSD and in relation to number of PRBs. We can also accept option 2 with no test on the traditional BS “total power dynamic range”. We do not agree with testing maximum output power with partial RB allocations as this is not aligned with earlier agreements. Sub topic 1-2:Issue 1-2-1, Power control test points: If the test is agreed to be defined, it is necessary to use small power control steps as the larger step sizes and their tolerances easily go beyond the specified dynamic range. Good justification is needed for why test requirement would not be specified for a core requirement.Issue 1-2-2, Test setup: We prefer to apply option 1 as much as possible, but to us the core idea of power control is to test that IAB-MT reacts to power control dynamically, i.e. a trigger for the power change is needed. Sub-topic 1-3: We are more aligned with option 1, though we think the reference frequency against which the error is measured should be present also. This should still allow the usage of BS test equipment, as the measurements can be consecutive. That is, you measure the absolute frequency of both the reference and transmitted signal, and post-process the relative error. |
| ZTE | **Issue 1-1: Test point** Option 1 is more preferred which is aligned with approved WF **Issue 1-2-1: Power control test points** No strong opinions on that since power tolerance is larger than power adjustment step. **Issue 1-2-2: Test set-up**Option 1 is preferred. **Issue 1-3: frequency error**Don’t have strong opinions on that, from requirement definition perspective, it’s relative value and should be comparable with parent freq or TE freq, however according to RAN1 agreement, it could also use GNSS based sync source, then absolute frequency error might also be used. Therefore flexibility could be considered.  |
| Samsung | **Issue 1-2-1: Power control test points**Even for proposal to define power control seems only for relative power control tolerance. And it seems no input on aggregate power control tolerance. It’s recommended suggestion on how to handle this conformance testing for this requirement. For relative power control tolerance for local Area IAB-MT, as mentioned in summary the UE relative power control tolerance conformance testing also configured as PRB allocation modification and +/-1dB power control comment which seems quite aligned with the RB allocation and PSD modified among test pointes to be defined for dynamic range. From this angle it seems the IAB-MT behaviour on power control and dynamic range can be verified together. And it is also fine if relative power control to be verified dedicated with simplified configuration compared with UE. **Issue 1-2-2: Test set-up**It’s suggested to align IAB-MT test set-up with latest agreement in common part.**Issue 1-3: frequency error**Similar to reply to issue 1-2-2, fine with option 1  |
| Huawei | Issue 1-1: Option 1 as agreed in CTW meeting is okIssue 1-2-1: As test is based on RF step accuracy not sure it matters which allocation is used, although perhaps it should always b eteh same.Issue 1-2-2: Option 1, a trigger to measure timing against is needed but if it is possible to avoid getting this form DL that is preferable (both options should be available)Issue 1-3: We prefer option 1 but if it can also be verified by option 2 thats ok also |
| Qualcomm | Issue 1-2-1: Either option 2 or option 3 can be used.Issue 1-2-2: Option 2 is preferred. Are option 1 and option 2 mutually exclusive?Issue 1-3: For Option 1, what is the sync signal? In our understanding this has to be a DL signal from the parent containing reference signals. In this case, what is the difference between Option 1 and option 2? |

### CRs/TPs comments collection

It is suggested to focus on technical discussion rather than detail TP.

## 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-topic1-1: Dynamic range** | *Tentative agreements:*Two options provided on 26th Jan GTW meeting for group review and option 1 is recognized as starting point for one company review and confirm. *Candidate options:*If it is possible review this on 29th Jan GTW meeting if time allowed.

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| Option 1(Samsung, Nokia, CATT, ZTE):* Test points 1: Maximum output power with full RB allocation and maximum output power
* Test points 2: single RB allocation with 5/10 dB lower PSD as used in test point 1)
* Test point 1- test point 2 = X+Y （+/- uncertainty FFS ）

Option 2 (E///, ZTE):* Test points 1: Maximum output power with full RB allocation and maximum output power
* Test points 3: Minimum output power (as set by 5/10 dB dynamic range requirement) with full RB allocation.
* Test point 4: Sing PRB transmission with same PSD as test point 1
* Test point 1- test point3 = X (+/- uncertainty FFS)
* Test point 1 – test point4 =Y (+/- uncertainty FFS)

FFS for test applicability among with other conformance requirements |

*Recommendations for 2nd round:*If the option 1 can be confirmed during 29th Jan GTW capture this as agreement in 2nd round  |
| **Sub-topic 1-2: power control for local Area IAB- MT** | *Tentative agreements:***Issue 1-2-1: Power control test points** 4 companies prefer to have explicit test case defined for power control and * One company prefers option 3 as proponent
* Other 3 companies fine with either option 2 or option 3.

2 companies have no strong opinion on whether to have the test since the power control step is rather small2 companies also see the possibility to merge power control in dynamic range. However, it seems all discussion and input would mainly for relative power control tolerance. But not concrete proposal on aggregated power control tolerance. **Issue 1-2-2: Test set-up** As pointed by companies, the both options abstracted from contribution should not exclude each other. Furthermore, on 26th Jan GTW meeting it is agreed in [306] as below. It’s assumed the test set-up for this specific requirement can be covered by below common agreement. And further discussion on test set-up for power control can be megered into issue 1-1-2 of [306].

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| **Issue 1-1-2: Two-way communication in IAB-MT tests in [306]**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. |

*Candidate options:***For relative power control accuracy:** Considering the majority view, the test condition on this requirement can be discussed based on “Option 3: Partial PRB allocation to be considered in Test model design if to reuse the similar test configuration as UE.” **For aggregated power control accuracy**:It’s recommended to provide companies view on conformance testing this requirement. *Recommendations for 2nd round:*Further discussion on relative power control accuracy and aggregated power control accuracy in 2nd round.Test set-up will be covered by [306] issue 1-1-2 if agreed  |
| **Sub-topic 1-3: frequency error** | *Tentative agreements:*As commented by companies, the both options abstracted from contribution should be enabled with the target to allow TE flexibility. Furthermore, on 26th Jan GTW meeting it is agreed in [306] as below on synchronization and measurement setup aspect.

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| **Topics from email thread [306]** **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).**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 |

It’s suggested to apply above agreement for frequency error.*Recommendations for 2nd round:*Further discuss whether above candidate suggestion agreeable to companies. If so further discuss on impact on * Test model design
* Test case draft for this requirement since flexibility on two approaches
* Whether link the applicability on which test approach with declaration or not.
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Recommendations on WF/LS assignment: Check the understanding in GTW first if time allowed. May continue comment based on moderator summary in 2nd round. Then work on WF after alignment on companies’ view.

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

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and 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: Possibility to control test burden

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2101962](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101962.zip) | ZTE Corporation | **Proposal 1: the number of IAB-MT conformance testing directions for each radiated Tx requirements should also that of IAB-DU.****Proposal 2: for Tx spurious emission and Rx OOBB requirement, either test requirements for IAB-DU or IAB-MT.**  |
| [R4-2102014](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102014.zip) | Nokia, Nokia Shanghai Bell | **Observation 1: RF requirements of IAB-DU and IAB-MT need to be sufficiently similar to apply test reduction.****Proposal 1: For implementations sharing the same RF hardware between IAB-MT and IAB-DU, amount of duplicated testing shall be minimized when it does not bring added value.****Proposal 2: It shall be declared whether RF HW is shared between IAB-MT and IAB-DU.****Proposal 3: It shall be declared whether RF HW is identical copy between IAB-MT and IAB-DU****Proposal 4: For shared or identical RF HW implementations it is deemed that test coverage is complete when combined set of IAB-DU and IAB-MT RF channel positions and test directions is the same as corresponding RF channel and test direction set of gNB.*** **FFS for which tests this is applied and what side conditions apply**

**Proposal 5: When it is identified that either IAB-MT or IAB-DU requirement is more demanding, it is sufficient to test only the more demanding requirement for shared or identical RF HW implementations.****Proposal 6: For shared or identical RF HW implementations receiver blocker tests (ACS, IBB, Rx IMD) are sufficient to perform only for IAB-MT with CP-OFDM interferer signal** |
| [R4-2102321](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102321.zip) | Ericsson | **Proposal-1: Add new declaration in the manufacture declaration list for how the transceiver is mapped tot the IAB-DU and IAB-MT.****Proposal-2: Add new chapter for the test case dependency for the shared architecture IAB implementation.****Proposal-3: the unwanted emission test can be reduced on share architecture and either IAB-DU or IAB-MT test would be good enough if the rated output power declaration is the same. Higher output power should be tested if the declared power is different.** |
| [R4-2102420](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102420.zip) | Huawei | **Observation 1:** There is very little scope to reduce the number of Tx directions/channels in the existing BS transmitter directional requirements test coverage.**Observation 2:** There is limited scope to reduce the number of channels for some transmitter TRP measurements but as these requirements are linked to regulatory limits the small gain in testing time does not justify the test coverage reduction.**Observation 3:** There is no scope to further reduce the co-location test coverage.**Observation 4:** the only scope for reducing the number of receiver test case is in-band blocking where the number of directions is reduced from 5 to 2.The IAB-MT test coverage should be the same as the IAB-DU, in the case of shared architecture test with common requirements (such as spurious emissions) need only be carried out once using the worst case test models. |

## Open issues summary

Last meeting RAN4 agreed the WF in R4-2017491 on test burden and test coverage as below :

**Test burden and test coverage analysis**

- Possible reduction of tests will be further analyzed taking into account test coverage for both IAB-DU and IAB-MT and for both conducted and radiated testing. Aspects to be analyzed include but are not limited to

* RF channels
* Test directions
* Shared vs. separated RF architecture
	+ Is this declared
	+ Testing only more demanding requirement for shared architecture

### Sub-topic 2-1

**Issue 2-1: Test coverage including directions**

* Proposals
	+ Option 1: The test coverage including test directions(in case of OTA) of IAB-MT should be the same as IAB-DU
	+ Option 2: TBA
* Recommended WF
	+ Confirm the understanding

**Issue 2-2: Applicability and criteria to test reduction**

* Proposals
	+ Proposal 1: For shared RF HW or identical RF HW between IAB-MT and IAB-DU the duplicated testing shall be minimized when it does not bring added value
	+ Proposal 2: FFS on criteria on how to reduce the test for above cases
		- Criteria 1: For which requirement(s) RF channel positions and test direction# verified and combined by both IAB-DU and IAB-MT in conformance testing can be recognized to compose the full set of test coverage purpose. Or to ensure the completed test set of conformance testing on IAB node how to split between IAB-DU and IAB-MT
		- Criteria 2: For which requirement(s) the worst case / most challenging case, if can be identified, could be applied
		- Criteria 3: for which requirement(s) verification on either IAB-MT or IAB-DU could be adequate.
		- Other criteria is not precluded.
	+ Proposal 3: To decide whether new sub-clause needed to capture above criteria(s) in conformance testing spec.
* Recommended WF
	+ Confirm the understanding and provide view on FFS part

**Issue 2-3: Additional declaration**

* Proposals: additional declaration(s) on top of existing BS ones should be introduced and further study needed on the detail on
	+ Alternative 1:
		- whether RF HW is shared between IAB-MT and IAB-DU
		- whether RF HW is identical copy between IAB-MT and IAB-DU
	+ Alternative 2: how the transceiver is mapped tot the IAB-DU and IAB-MT
	+ other alternative is not precluded.
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| XXX | Sub topic 2-1: Sub topic 2-2:….Others: |
| CATT | **Issue 2-1: Test coverage including directions**Our current understanding aligns with option 1.**Issue 2-2: Applicability and criteria to test reduction** We support the direction of proposal 1. The general criteria need to be captured in spec. Other clarification such as which requirements should be tested for both IAB-DU and IAB-MT if there’re any even the HW is shared. For the detail split for IAB-DU and IAB-MT regarding the common test, we don’t think it’s necessary. Flexibility for vendors should be allowed.**Issue 2-3: Additional declaration**Declaration may be needed and the declaration similar with Alternative 1 may be sufficient. |
| Ericsson | **Issue 2-1: Option 1. We are fine with the same directions for both the IAB-DU and IAB-MT. UE FR2 also test the spherical coverage for EIRP and EIS.** **Issue 2-2: Propsals seems ok. For P2, the criteria to apply the test burden reduction needs to be analysed case by case.** **Issue 2-3: maybe first we agree on the declaration way of common hardware for IAB-MT and IAB-DU. Then the exact wording if needed we could agree on the possible WF.**  |
| Nokia, Nokia Shanghai Bell | Sub topic 2-1: Issue 2-1: For separated RF HW, yes. When it comes to test directions, further considerations may be useful as IAB-MT may operate all its lifetime pointing only towards the same parent node. For shared RF HW DU and MT should be looked at together, and not considered as independent units.Issue 2-2: Agree with proposal 1. For proposal 2, all three criteria should be used. Examples are provided here: Criteria 1: This should be considered especially for TRP measurments, which are the most time consuming ones. For example, it could considered to measure IAB-MT ACLR in channel B and IAB-DU ACLR in channel T.Secondarily, this criteria should be considered for other requirements with multiple channel positions and directions.Criteria 2: For receiver blocking tests it is clear that CP-OFDM has higher PAPR and is therefore more challenging interferer, it is not necessary to test the same also with DFT-s-OFDM interferer.Criteria 3: Spurious emissions is one good example of a case where requirement is the same and with both IAB-MT and IAB-DU transmitting CP-OFDM the result is not expected to change between IAB-MT and IAB-DU.We recommend to combine tables similar to table 1 and table 2 in R4-2102014, and gather comments there for each requirement.For proposal 3, this can be discussed when the decisions and the test reductions have been done. It may be sufficient to capture information in the initial conditions of the test or in overview tables, and these may not require additional clauses.Issue 2-3: We see both alternative 1 and alternative 2 may be used. Alternative 2 alone may not be enough.  |
| ZTE | **Issue 2-1: Test coverage including directions**Option 1 and further reduction might not reduce much test burden especially considering from EIRP based testing perspective.**Issue 2-2: Applicability and criteria to test reduction** For the proposal 2 criteria 1, it might complicate the discussion, since it might be difficult to how to split the test between IAB-DU and IAB-MT.**Issue 2-3: Additional declaration**As mentioned by Ericsson, we need to discuss the declaration for common or shared hardware for IAB-MT and DU firstly, then we think it should be common understanding to reduce the test burden. |
| Samsung | **Issue 2-1: Test coverage including directions**Fine with the option 1and explicit overview table for IAB node radiated requirement should be defined accordingly**Issue 2-2: Applicability and criteria to test reduction** Support proposal 1. And the criteria gathered from contributions provided on this topic sound reasonable and would agree to work further on details**Issue 2-3: Additional declaration**Would like more time to think about the declaration after related discussion on common part[306] converged.  |
| Huawei | Issue 2-1: Option 1, we see no significant scope for reduction – The issue of combining IAB-DU and IAB-MT test points for shared architectures can be further discussed (either they are same or can identify worst case)Issue 2-2: Proposal 1 is certainly o, P2 and P3 are also sensible, for directions if HW is shared it seems likely that the steering capabilities will be the same so this is probably not an issue. But if they are different we should investigate if there is a worst case.Issue 2-3: If the test burden is to be shared for a shared architecture it seems that the RF parts have to be identical, for example if IAB-MT part is lower power and uses same PA at different bias setting then linearity and emissions couldn’t be considered the same and hence test might be needed under both conditions. The obvious method for this is a declaration, we need to work on a good definition of “the same” |

### CRs/TPs comments collection

No TP will be discussed for this topic.

## 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**  |
| **Issue 2-1: Test coverage including directions** | *Tentative agreements:*According to discussion the option 1 is agreed as common understanding from the angle that no much room for further reduction on IAB-MT test coverage compared with existing scope for IAB-DU if two interfaces considered independently. And the possible and agreeable discussion direction to restrict the entire test burden for IAB node as a whole which share RF architecture of which the specific applicable category can be further discussed and decided on exact definition. *Recommendations for 2nd round:*Capture the agreement in WF assigned for 2nd round.  |
| **Issue 2-2: Applicability and criteria to test reduction**  | *Tentative agreements:*Proposal 1 is agreeable according to company feedback. And it seems no other case is proposed to be considered for test reduction. *Candidate options:*The criteria listed in proposal 2 still need further discussion according to comment received. And there are specific concerns summarized as below:* Concern on criteria 1: difficulty and necessity to specify how to split test points between IAB-MT and IAB-DU
* Concern on criteria 2: if beam steering capability is different between IAB-DU and IAB-MT, the possibility and how to identify worst case. It may also impact on the test reduction applicability for IAB node with different steering capability for IAB-DU and IAB-MT.

Regarding proposal 3 even though it’s considered reasonable to capture the necessary conclusion in specification it’s preferred to postponed the discussion on how to captured this in specification after we are closed to final decision. Hence it is suggested to consider specification impact in later stage. *Recommendations for 2nd round:*Capture the proposal 1 in WF assigned for 2nd round.Discuss the detail on criteria further in 2nd round requirement by requirement if possible. If time is not allowed at least WF for future study should be addressed in WF assigned for 2nd round  |
| **Issue 2-3: Additional declaration**  | *Tentative agreements:*Common understanding is declaration is needed.But considering the declaration on normal case is still discussing under thread 306 there is preferred to make decision on additional declaration after the common part decision.However, it’s still believed parallel discussion on definition and description the declaration can be allowed but final decision can be expected for next meeting if time limited during 2nd round. *Recommendations for 2nd round*Capture agreement on necessity to have additional declaration in WF assigned for 2nd and discuss the definition and description further if possible.  |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 | WF on IAB-MT test coverage and IAB node test burden reduction  | Nokia |

### CRs/TPs

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

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

## 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”* |