**3GPP TSG-RAN WG4 Meeting # 97-e R4-200XXXX**

**Electronic Meeting, 2 – 13 Nov., 2020**

**Agenda item:** 7.3.3, 7.3.4

**Source:** Moderator (Samsung)

**Title:** Email discussion summary for [97e][310] 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 three topics as below:

* Topic#1: Dynamic range, Power control and Frequency error for IAB-MT
* Topic#2: Conducted conformance testing
* Topic#3: Radiated conformance testing

Since this is the first meeting to have discussion on IAB conformance testing, it is suggested to collect view on proposals presented in contributions for this meeting and work on way forward for future study based on baseline consensus to be captured in [309] if has dependency.

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

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014391 | CATT | Proposal 1: Only full RB allocation is tested for IAB-MT minimum output power.  Proposal 2: Both full RB and partial RB allocation are tested for IAB-MT maximum output power. The RB number of partial RB can be discussed further. |
| R4-2015441 | Nokia, Nokia Shanghai Bell | Observation 1: Aggregate power tolerance appears to test such basic functionality without which any node cannot function properly. It could be considered to be met already by basic output power measurements.  Observation 2: Either a new test model are some other guidelines are needed on how measurement equipment behaves in IAB-MT frequency error test.  Proposal 1: Test points for dynamic range is set to Low PSD with narrow RB allocation and high PSD with full RB allocation.  Proposal 2: Test requirement for dynamic range is PSD difference added to the 10-base logarithm of difference of allocation sizes of the reference conditions.  Proposal 3: Dynamic range and power control tests are defined separately.  Proposal 4: Relative power tolerance test efforts should be concentrated on verifying smallest power control step sizes when RB allocation is kept constant.  Proposal 5: Adopt the same considerations also for conducted testing. |

## Open issues summary

For IAB-MT RF aspect, most requirements refer to BS ones except dynamic range, power control and frequency error which are fundamentally different compared with BS for which the test detail such as test procedure and condition should be analysed further. Currently, under this topic, the proposals are applied for both conducted and radiated testing.

### Sub-topic 1-1: dynamic range for IAB-MT

The reference condition is still open on how to verify the dynamic range of IAB-MT. As summarized in R4-2015441 there are several candidate combinations of PSD and RB allocation for dynamic range reference condition as:

[1] Low PSD with narrow RB allocation

[2] Low PSD with full RB allocation

[3] High PSD with partial RB allocation

[4] High PSD with full RB allocation

**Issue 1-1: reference condition on dynamic range for IAB-MT**

* Proposals
  + Option 1: [R4-2014391] Test point on
    - [2] Low PSD with full RB allocation
    - [3] High PSD with partial RB allocation
    - [4] High PSD with full RB allocation
  + Option 2: [R4-2015441] Test point on with test requirement as PSD difference + 10\*log10(NRBratio)
    - [1] Low PSD with narrow RB allocation
    - [4] High PSD with full RB allocation
* Recommended WF
  + TBA

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

For power control requirement, it is only defined for Local Area IAB-MT. And this requirement is one of the requirements which is not referred to BS requirement. Hence the test procedure, test condition should be studied.

**Issue 1-2: Test independency of power control and dynamic range**

* Proposals: [R4-2015441] Dynamic range and power control tests to be defined separately.
* Recommended WF
  + Check and confirm above proposal

**Issue 1-3: Relative power accuracy**

* Proposals
  + Option 1: [R4-2015441] Test point for relative power accuracy would be on smallest power control step size with constant RRB allocation
  + Option 2: TBA
* Recommended WF
  + TBA

**Issue 1-4: Aggregated power accuracy**

* Proposals
  + Option 1: [R4-2015441] it’s observed that there seems no need to redundantly verify aggregated power accuracy of which functionality has already verified in basic power requirement.
  + Option 2: TBA
* Recommended WF
  + TBA

### Sub-topic 1-3: frequency error for IAB-MT

Frequency error of IAB-MT follows the UE requirement to be compared with received carrier frequency. It should be clarified on the test set-up and procedure. However, this may also belong to and/or be dependent on common aspect to be discussed in thread [309]. Hence the status is summarized here with no urgency to decide this point within this thread for this meeting.

**Issue 1-5: reference condition on dynamic range for IAB-MT**

* Proposals
  + Option 1: [R4-2015441] FFS needed on frequency error testing for IAB-MT
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |

## 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 |  |  |

## 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 #2: Conducted conformance testing

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2016246 | Ericsson | Proposal#1: Reusing the BS type 1-H test specification for conducted transmitter characteristic for IAB-DU type 1-H.  Observation#1: Measurement/connection setup in BS and UE both are informative.  Proposal#2: Allow the test measurement/connection setup flexibility in the conducted transmitter test procedure.  Proposal#3: In test procedure description, there is no need to describe downlink configuration and how to trigger the IAB-MT uplink transmission. The test model/waveform to be transmitted shall be specified.  Proposal#4: One option is to reuse the clause of BS interpretation of measurement results for IAB-MT with the modification of adding the UE test system uncertainty if different MU from different test environment would be allowed for IAB-MT testing.  Proposal#5: RAN4 discuss if the same TT definition for the different transmitter test setup for the same test case.  Proposal#6: RAN4 discuss if it the same MU definition for the different transmitter test setup for the same test case  Proposal#7: Use the BS test case structure for test case drafting.  Proposal#8: There is no need to specify the message content in test case.  Proposal#9: RAN4 discuss the recommendation of TT for IAB-MT test case in the Table 1 and Table 2 above. |
| R4-2016247 | Ericsson | Proposal#1: Reusing the BS type 1-H test specification for conducted receiver characteristic for IAB-DU type 1-H.  Observation#1: Measurement/connection setup in BS and UE both are informative.  Proposal#2: Allow the test measurement/connection setup flexibility in the conducted receiver test procedure.  Proposal#3: align with performance testing FRC definition.  Proposal#4: One option is to reuse the clause of BS interpretation of measurement results for IAB-MT with the modification of adding the UE test system uncertainty if different MU from different test environment would be allowed for IAB-MT testing.  Proposal#5: RAN4 discuss if the same TT definition for the different test setup for the same test case.  Proposal#6: RAN4 discuss if it the same MU definition for the different test setup for the same test case.  Proposal#7: Use the BS test case structure for receiver test case drafting.  Proposal#8: There is no need to specify the message content in receiver test case.  Proposal#9: RAN4 discuss the recommendation of TT definition for IAB-MT test case in the Table 1 and Table 2 above. |

## Open issues summary

Many discussion points in contribution submitted for this topic are overlapping or dependent on aspect in general or common aspects to be discussed in [309]. In the draft version of summary all content would be captured.

But Sub topic marked as [General/common] may be updated to remove after review.

### Sub-topic 2-1: testing on IAB-DU type 1-H

**Issue 2-1: Confirmation on IAB-DU testing understanding**

* Proposal : Reusing the BS type 1-H test specification for conducted transmitter and receiver characteristic for IAB-DU type 1-H

Note: how to organize the IAB specification would be determined separately

* Recommended WF
  + To confirm above proposal

### Sub-topic 2-2:General aspect for IAB-MT testing [General/common]

**Issue 2-2: General aspect**

* Proposals
  + Test measurement/connection setup: allow flexibility
  + Transmitter UL RMC Vs. Test model: Test model and Waveform to be defined only
  + Receiver DL baseband configuration for RF: align with performance testing FRC definition
  + MU/TT: Further study needed on how the definition could be to fit for both BS and UE test setup if both agreed to be applicable for IAB-MT
    - This would have impact on interpretation on measurement result.
  + Test case drafting structure: Use the BS test case structure without specific message content in each test case for IAB-MT
* Recommended WF
  + TBA

### Sub-topic 2-3: Specific analysis for each requirement on IAB-MT

Test tolerance for each conducted requirement is provided in R4-2016246 and R4-2016247 based on UE and BS test environment respectively. It may be premature to make decision now since general/common aspects are still open. However, it is still recommended comment provided if any to facilitate future discussion.

**Issue 2-3: Test tolerance analysis**

* Initial analysis submitted in R4-2016246 and R4-2016247
* Recommended WF
  + Collect comment

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |

## 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:* |

*Suggestion on WF/LS assignment*

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

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## Summary on 2nd round (if applicable)

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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 #3: Radiated conformance testing

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2015442 | Nokia, Nokia Shanghai Bell | Observation 1: Receiver test are very similar between IAB-DU and IAB-MT which provides an opportunity to relieve the increasing IAB-Node test burden especially for implementation where IAB-DU and IAB-MT share the same RF HW.  Proposal 1: Test procedures specified for gNB apply also for IAB-DU and IAB-MT as long as it is ensured that correct physical signals are applied.  Proposal 2: Aim to reduce the amount of receiver tests for shared RF HW implementations for each main test by mandating only test signals which stress the receiver RF characteristics the most, independent of whether wanted signal type is UL or DL.  Proposal 3: When requirement is equal, such as in out-of-band blocking test, there is no need to repeat it for IAB-MT and IAB-DU when the RF HW is shared.  Proposal 4: RAN4 should aim at test case reduction also for shared RF architecture.  Proposal 5: Adopt the same considerations for conducted testing. |
| R4-2016248 | Ericsson | Proposal#1: Reusing the BS type 1-H, 1-O and 2-O test specification for radiated transmitter characteristic for IAB-DU type 1-H, 1-O and 2-O.  Proposal#2: RAN4 discuss how to allow the reusing the UE and BS OTA test methodology for IAB-MT.  Proposal#3: RAN4 investigate if test time could be further reduce on shared transceiver architecture using the same OTA test methodology.  Observation#1: co-location requirement needs to be defined for IAB-MT type 1-O when the UE OTA test methodology is used.  Proposal#4: IAB-MT TX ON/OFF and IAB-MT TX transient period should be classified with co-location requirement for conformance testing.  Proposal#5: RAN4 further discuss the Number of the conformance directions needed for each Tx requirement.  Observation#2: Measurement/connection setup in BS and UE both are informative.  Proposal#2: Allow the test measurement/connection setup flexibility in the radiated transmitter test procedure.  Proposal#3: In test procedure description, one option is that no description of downlink configuration and how to trigger the IAB-MT uplink transmission. Only the test model/waveform to be transmitted shall be specified.  Proposal#4: One option is to reuse the clause of BS interpretation of measurement results for IAB-MT with the modification of adding the UE test system uncertainty if different MU from different test environment would be allowed for IAB-MT testing.  Observation#3: UE test system uncertainty does not contain the extreme conditions and has several limitation factors (Power class, testing method and quiet zone size).  Proposal#5: RAN4 discuss further the extreme condition test system uncertainty for IAB-MT test.  Proposal#6: RAN4 discuss if the same TT definition for the different transmitter test setup for the same test case.  Proposal#7: RAN4 discuss if it the same MU definition for the different transmitter test setup for the same test case  Proposal#7: Use the BS test case structure for test case drafting.  Proposal#8: There is no need to specify the message content in test case.  Observation#4: UE TS 38.521-2 does not have FR1 OTA testing, thus FR1 OTA testing MU and TT needs to be added in UE test environment.  Proposal#7: RAN4 discuss the recommendation of TT for IAB-MT test case in the Table 1 and Table 2 above. |
| R4-2016249 | Ericsson | Proposal#1: Reusing the BS type 1-H, 1-O and 2-O test specification for radiated receiver characteristic for IAB-DU type 1-H, 1-O and 2-O.  Proposal#2: RAN4 discuss how to allow the reusing the UE and BS OTA test methodology for IAB-MT.  Proposal#3: RAN4 investigate if test time could be further reduce on shared transceiver architecture using the same OTA test methodology.  Proposal#4: RAN4 further discuss the Number of the conformance directions needed for each Rx requirement.  Observation#1: Measurement/connection setup in BS and UE both are informative.  Proposal#5: Allow the test measurement/connection setup flexibility in the radiated receiver test procedure.  Proposal#6: align with performance testing FRC definition.  Proposal#7: One option is to reuse the clause of BS interpretation of measurement results for IAB-MT with the modification of adding the UE test system uncertainty if different MU from different test environment would be allowed for IAB-MT testing.  Proposal#8: RAN4 discuss if the same TT definition for the different receiver test setup for the same test case.  Proposal#9: RAN4 discuss if it the same MU definition for the different receiver test setup for the same test case  Proposal#10: Use the BS test case structure for test case drafting.  Proposal#11: There is no need to specify the message content in test case.  Observation#2: UE TS 38.521-2 does not have FR1 OTA testing, thus FR1 OTA testing MU and TT needs to be added in UE test environment.  Proposal#12: RAN4 discuss the recommendation of TT for IAB-MT test case in the Table 1 and Table 2 above. |

## Open issues summary

Many discussion points in contribution submitted for this topic are overlapping or dependent on aspect in general or common aspects to be discussed in [309]. In the draft version of summary all content would be captured.

But Sub topic marked as [General/common] may be updated to remove after review.

### Sub-topic 3-1: Testing on IAB-DU type 1-H 1-O and 2-O

**Issue 3-1: Confirmation on IAB-DU testing understanding**

* Proposal: Reusing the BS type 1-H, 1-O and 2-O test specification for radiated transmitter and receiver characteristic for IAB-DU type 1-H, 1-O and 2-O respectively.

Note: how to organize the IAB specification would be determined separately

* Recommended WF
  + To confirm above proposal

### Sub-topic 3-2 General aspect for IAB-MT testing **[General/common]**

**Issue 3-2-1: General aspect**

* Proposals
  + OTA testing methodology: Study on how to allow UE and BS OTA methodology for IAB-MT
  + Test measurement/connection setup: allow flexibility
  + Transmitter UL RMC Vs. Test model: Test model and Waveform to be defined only
  + Receiver DL baseband configuration for RF: align with performance testing FRC definition
  + MU/TT: Further study needed on how the definition could be to fit for both BS and UE test setup if both agreed to be applicable for IAB-MT
    - This would have impact on interpretation on measurement result.
    - Study further the extreme condition test system uncertainty for IAB-MT test**.**
  + Test case drafting structure: Use the BS test case structure without specific message content in each test case for IAB-MT
* Recommended WF
  + TBA

**Issue 3-2-2: Balance between test coverage and test burden**

* Proposals: it is suggested to control the test case number/time with balance of test coverage and test burden especially for shared RF architecture implementation.
* Recommended WF
  + TBA

### Sub-topic 3-3: Specific analysisi for each requirement on IAB-MT

**Issue 3-3-1: Test tolerance analysis**

Test tolerance for each OTA requirement is provided in R4-2016248and R4-2016249 based on UE and BS test environment respectively. It may be premature to make decision now since general/common aspects are still open. However, it is still recommended comment provided if any to facilitate future discussion.

* Initial analysis submitted in R4-2016248 and R4-2016249
* Recommended WF
  + Collect comment

**Issue 3-3-2: Test procedure on receiver requirements**

* Proposals: Test procedures specified for gNB apply also for both IAB-DU and IAB-MT as long as it is ensured that correct physical signals are applied
* Recommended WF
  + TBA

**Issue 3-3-3: IAB-MT type 1-O co-location requirement clarification**

* Proposal: To clarify that the same as other type 1-O radiated requirement classified as “co-location”, such as Transmitter IM and co-location requirement for spurious emission, for IAB-MT TX ON/OFF and TX transient period should also be classified as co-location requirement for conformance testing.
* Recommended WF
  + TBA

**Issue 3-3-4: IAB-MT direction to be tested**

* Proposal: FFS on number of conformance directions needed for each OTA requirements
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |

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|  | Company B |
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## Summary for 1st round

### Open issues

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

*Suggestion on WF/LS assignment*

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

## 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”* |