**3GPP TSG-RAN WG4 Meeting #97-e R4-2017279**

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

**Agenda item:** 7.4.4, 7.4.5

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [97e][209] NR\_IAB\_RRM

**Document for:** Information

# Introduction

The scope of this email discussion summary covers following agenda items.

7.4.4 RRM core requirements maintenance

7.4.5 RRM perf. requirements

 7.4.5.1 General

7.4.5.2 Test cases

# Topic #1: Core requirements maintenance

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2015790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015790.zip) | Huawei, HiSilicon | CR on Link recovery for IAB-MT |
| [R4-2015791](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip) | Huawei, HiSilicon | CR on RLM for IAB-MT |
| [R4-2016028](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016028.zip) | Samsung | DraftCR for TR38.809: IAB RRM general |
| [R4-2016170](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016170.zip) | Ericsson | Symbols, abbreviations and definitions for IAB RRM in 38.174 |
| [R4-2016171](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016171.zip) | Ericsson | * **Observation 1:** All IAB-MT RRM requirements are applicable when no DRX is used. But definition of no DRX is missing in TS 38.174.
* **Proposal 1:** Conditions under which IAB-MT shall assume no DRX is used are defined in TS 38.174.
* **Proposal 2:** In proposal 1, conditions are the same as defined for the UE in section 3.6.1, TS 38.133.
* **Observation 2:** IAB-MT RLM and link recovery requirements are impacted by the measurement gap configuration. But applicable measurement gaps for local area IAB-MT for meeting RLM and link recovery requirements are missing in TS 38.174.
* **Proposal 3:** Specify applicable measurement gap configurations for local area IAB-MT for meeting RLM and link recovery requirements in TS 38.174.
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| [R4-2016382](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016382.zip) | Nokia, Nokia Shanghai Bell |  requirements in TS 38.174 |

## Open issues summary

### Sub-topic 1-1

**Issue 1-1: Conditions under which IAB-MT shall assume no-DRX**

* Proposals
	+ Option 1: Conditions are the same as defined for the UE in section 3.6.1, TS 38.133 (Ericsson)
* Recommended WF
	+ Discussions are needed.

**Issue 1-2: Whether to specify applicable MGs for local area IAB-MTs**

* Proposals
	+ Option 1: Specify applicable measurement gap configurations for local area IAB-MT for meeting RLM and link recovery requirements in TS 38.174 (Ericsson)
* Recommended WF
	+ Discussions are needed.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | Issue 1-1: Agree with option 1.Issue 1-2: The gap applicability for UE in 38.133 should be taken as the starting point for LA IAB-MT, and also the mandatory gap patterns should be discussed. |
| Nokia | **Issue 1-1: Conditions under which IAB-MT shall assume no-DRX**OK with Option 1**Issue 1-2: Whether to specify applicable MGs for local area IAB-MTs**RLM shall be met independent from the measurement gap. Could Ericsson clarify which measurement gap is applicable for MT? |

### 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** |
| [R4-2015790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip) | Huawei: There are similar changes in [R4-2016382](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016382.zip). Could be merged to one CR. |
| Qualcomm: The proposed changes to 12.3.2.5.2 should apply to both FR1 and FR2. So we suggest removing the hyphens at the beginning of these two sentences. |
| Nokia: the change is fine. Some overlapping with CR R4-2016382. |
| [R4-2015791](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip) | Huawei: There are similar changes in [R4-2016382](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016382.zip). Could be merged to one CR. |
| Qualcomm: We agree. |
| Nokia: the change is fine. Some overlapping with CR R4-2016382. |
| [R4-2016028](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016028.zip) | Ericsson: Looks fine. |
| Samsung: Necessary section and structures for IAB spec 38.809. |
|  |
| [R4-2016170](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016170.zip) | Nokia: the change is fine. Abbreviation part is overlapping with CR R4-2016382. |
|  |
| [R4-2016382](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016382.zip) |  |
|  |

## 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**  |
| **Issue 1-1** | *Tentative agreements:* Conditions under which IAB-MT shall assume no DRX is used are the same as defined for the UE in section 3.6.1, TS 38.133.*Candidate options:**Recommendations for 2nd round:* No need to further discuss. |
| **Issue 1-2** | *Candidate options:* * + Option 1: Specify applicable measurement gap configurations for local area IAB-MT for meeting RLM and link recovery requirements in TS 38.174 (Ericsson)

*Recommendations for 2nd round:* Further discuss. Ercisson can clarify and address to the questions raised during the 1st 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**  |
| [R4-2015790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip) | To be merged with CR R4-2016382. |
| [R4-2015791](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip) | To be merged with CR R4-2016382. |
| [R4-2016028](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016028.zip) | To be agreed. |
| [R4-2016170](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016170.zip) | To be revised. Exclude the abbreviation part which is captured in CR R4-2016382. |
| [R4-2016382](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016382.zip) | To be revised to capture also changes in [R4-2015790](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip) and [R4-2015791](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015791.zip). |

## Discussion on 2nd round (if applicable)

**Issue 1-2: Whether to specify applicable MGs for local area IAB-MTs**

* Proposals
	+ Option 1: Specify applicable measurement gap configurations for local area IAB-MT for meeting RLM and link recovery requirements in TS 38.174 (Ericsson)
* Recommended WF
	+ Discussions are needed. Ericsson is encouraged to address to the questions raised during the first round.

## Companies views’ collection for 2nd round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  | **Issue 1-2: Whether to specify applicable MGs for local area IAB-MTs** |
| Ericsson | RLM and link recovery requirements depend on measurement gaps i.e. MGL and MGRP. But they are not defined anywhere in 38.174 making RLM/BM requirements unclear. The gaps are used for RRM measurements but there are no RRM requirements for IAB-MT. Therefore, one possibility is to remove gaps aspects from RLM and link recovery requirements. Another option is to define at least one gap pattern (e.g. basic gap patterns GP#0 and GP#1) in TS 38.174 applicable for LA IAB-MT.  |
| Nokia | We are wondering whether we need gaps for IAB-MTs. Could this be clarified?  |
| Ericsson2 | Answer to Nokia question. Ericsson was not proponent of RLM and BM requirements. So I cannot say the reason. It is possibly copy paste from 38.133 or some other reason. Fact is parameter P depends on gap configuration. So either gap aspect is removed from RLM and BM or we should define gaps in 38.174.12.3.2.2.2 Minimum requirementIAB-MT shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set  estimated over the last TEvaluate\_BFD\_SSB ms period becomes worse than the threshold Qout\_LR\_SSB within TEvaluate\_BFD\_SSB ms period.The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-1 for FR1.The value of TEvaluate\_BFD\_SSB is defined in Table 8.5.2.2-2 for FR2 with scaling factor N= 8.For FR1,- $P=\frac{1}{1-\frac{T\_{SSB}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB.- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.For FR2,- $P=\frac{1}{1-\frac{T\_{SSB}}{T\_{SMTCperiod}}}$, when BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (TSSB < TSMTCperiod).- P = Psharing factor, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC period (TSSB = TSMTCperiod).- $P=\frac{1}{1-\frac{T\_{SSB}}{MRGP} - \frac{T\_{SSB}}{T\_{SMTCperiod}}}$, when the BFD-RS resource is partially overlapped with measurement gap and the |
| Nokia2 | Thank Ericsson for explanation. We think we can continue this discussion and decide in which way to handle the requirements related to measurement gaps in next meeting. |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| Revised [R4-2016170](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016170.zip) | Moderator: companies please trigger a separate thread under thread 209 to discuss the revised CR. |
| Revised [R4-2016382](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016382.zip) | Moderator: companies please trigger a separate thread under thread 209 to discuss the revised CR. |

## 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: Perf. requirements and test cases for IAB-MTs

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2014184](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014184.zip) | ZTE Corporation | [draft CR] Test cases for timing for IAB-MT |
| [R4-2015510](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015510.zip) | Huawei, HiSilicon | **Proposal 1: The RRM performance testing requirements shall be defined and maintained in RAN4.****Proposal 2: Only RRM performance requirements for IAB-MT are needed and the IAB-MT shall be tested with DU part disabled.****Proposal 3: Different types of IAB (type 1-H, type 1-O and type 2-O) shall be considered to decide the test methodology (conducted/OTA). Use conducted testing for IAB type 1-H and OTA testing for IAB type 1-O and 2-O.****Proposal 4: Define test cases for RRM requirements under NR SA.****Proposal 5: Align with the conclusion from RF and Demod sessions and include all performance requirements in a single dedicated spec for IAB.** **Observation1: The IAB node will be deployed in a pre-planned manner with stable channel conditions, which means it is less likely for an IAB node to experience the link broken or re-establishment after the IAB node is deployed compared with original UE.****Observation 2: The test procedures and setup for original UE defined in RAN5 may not be applicable to IAB-MT.****Proposal 6: RAN4 to consider simplifying the RRM requirements testing for IAB-MT to define typical scenarios and key configurations for RRM requirements and taking TS 38.133 as the baseline.** **Proposal 7: The performance requirements shall be differentiated between wide area IAB-MT and local area IAB-MT if needed.** |
| [R4-2015511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015511.zip) | Huawei, HiSilicon | **Proposal 1: As there is no cell reselection and RRM measurement requirements, only unknown target cell should be considered in the testing.****Observation 1: It hard to define the number of frequency layers for inter frequency RRC re-establishment.****Observation 2: How to trigger the RRC re-establishment for wide area IAB-MT should be further discussed.****Observation 3: There is specific RA resource defined for IAB-MT.****Observation 4: The RA process for IAB-MT is much simple and happens infrequently compared with original UE.****Proposal 2: It is suggested not to define separate test cases of RA for IAB-MT.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test cases**  | **IAB type**  | **IAB-MT class** | **Conducted/OTA** | **Parameters** |
| Transmit Timing Test for FR1 | IAB 1-H | Wide area / Local area | conducted | Non-DRX |
| Transmit Timing Test for FR1 | IAB 1-O | Wide area / Local area | OTA | Non-DRX |
| Transmit Timing Test for FR2 | IAB 2-O | Wide area / Local area | OTA | Non-DRX |
| FR1 timing advance adjustment accuracy | IAB 1-H | Wide area / Local area | conducted | Non-DRX |
| FR1 timing advance adjustment accuracy | IAB 1-O | Wide area / Local area | OTA | Non-DRX |
| FR2 timing advance adjustment accuracy | IAB 2-O | Wide area / Local area | OTA | Non-DRX |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test cases**  | **IAB type**  | **IAB-MT class** | **Conducted/OTA** | **Parameters** |
| RLM OOS Test for FR1 PCell configured with SSB-based RLM RS | IAB 1-H | Local area | conducted | Non-DRX |
| RLM OOS Test for FR1 PCell configured with SSB-based RLM RS | IAB 1-O | Local area | OTA | Non-DRX |
| RLM OOS Test for FR2 PCell configured with SSB-based RLM RS | IAB 2-O | Local area | OTA | Non-DRX |
| RLM IS Test for FR1 PCell configured with SSB-based RLM RS | IAB 1-H | Local area | conducted | Non-DRX |
| RLM IS Test for FR1 PCell configured with SSB-based RLM RS | IAB 1-O | Local area | OTA | Non-DRX |
| RLM IS Test for FR2 PCell configured with SSB-based RLM RS | IAB 2-O | Local area | OTA | Non-DRX |
| RLM OOS Test for FR1 PCell configured with CSI-RS-based RLM RS | IAB 1-H | Local area | conducted | Non-DRX |
| RLM OOS Test for FR1 PCell configured with CSI-RS -based RLM RS | IAB 1-O | Local area | OTA | Non-DRX |
| RLM OOS Test for FR2 PCell configured with CSI-RS -based RLM RS | IAB 2-O | Local area | OTA | Non-DRX |
| RLM IS Test for FR1 PCell configured with CSI-RS -based RLM RS | IAB 1-H | Local area | conducted | Non-DRX |
| RLM IS Test for FR1 PCell configured with CSI-RS -based RLM RS | IAB 1-O | Local area | OTA | Non-DRX |
| RLM IS Test for FR2 PCell configured with CSI-RS -based RLM RS | IAB 2-O | Local area | OTA | Non-DRX |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test cases**  | **IAB type**  | **IAB-MT class** | **Conducted/OTA** | **Parameters** |
| BFD and LR Test for FR1 PCell configured with SSB-based BFD and LR | IAB 1-H | Local area | conducted | Non-DRX |
| BFD and LR Test for FR1 PCell configured with SSB-based BFD and LR | IAB 1-O | Local area | OTA | Non-DRX |
| BFD and LR Test for FR2 PCell configured with SSB-based BFD and LR | IAB 2-O | Local area | OTA | Non-DRX |
| BFD and LR Test for FR1 PCell configured with CSI-RS-based BFD and LR | IAB 1-H | Local area | conducted | Non-DRX |
| BFD and LR Test for FR1 PCell configured with CSI-RS -based BFD and LR | IAB 1-O | Local area | OTA | Non-DRX |
| BFD and LR Test for FR2 PCell configured with CSI-RS -based BFD and LR | IAB 2-O | Local area | OTA | Non-DRX |

**Proposal 3: Define the test cases in the above tables for RRM requirements for IAB.****Moderator’s Note:** Please check the original paper for the complete Table. |
| [R4-2016172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016172.zip) | Ericsson | Specification structure for IAB-MT RRM test cases in 38.174 |
| [R4-2016173](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016173.zip) | Ericsson | * **Proposal 1:** RRM tests are defined in both FR1 and FR2 to verify all IAB-MT requirements defined in TS 38.174.
* **Proposal 2:** IAB-MT RRM tests shall be defined with level of details comparable to those in UE RRM tests defined in TS 38.133
* **Proposal 3:** New annex in TS 38.174 shall contain IAB-MT RRM test configuration, RRM tests and conditions for bands in which IAB-MT requirements apply.
 |
| [R4-2016174](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016174.zip) | Ericsson | * **Proposal 1:** List of test cases in table 1 are approved.
* **Proposal 2:** Work split among volunteer companies to be agreed in RAN4#97-e.
* **Proposal 3:** Initial drafts in RAN4#98-e and final CRs in RAN4#98bis-e.

**Table 1: Proposed List of RRM tests for IAB-MT**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **RRM Test cases** | **Related RRM Requirements**  | **Volunteer company** |
| 1 | RRC Re-establishment in FR1 | 12.1.1.1 SA: RRC Re-establishment | Ericsson |
| 2 | RRC Re-establishment in FR2 | Ericsson |
| 3 | Random access in FR1 | 12.1.1.2 Random access |  |
| 4 | Random access in FR2 |  |
| 5 | RRC Connection Release with Redirection to NR in FR1 | 12.1.1.3 SA: RRC Connection Release with Redirection to NR |  |
| 6 | RRC Connection Release with Redirection to NR in FR2 |  |
| 7 | IAB-MT transmit timing in FR1 | 12.2.1 IAB-MT transmit timing |  |
| 8 | IAB-MT transmit timing in FR2 |  |
| 9 | IAB-MT timing advance in FR1 | 12.2.3 IAB-MT timing advance |  |
| 10 | IAB-MT timing advance in FR1 |  |
| 11 | RLM OOS with SSB in FR1 | 12.3.1.2 Requirements for SSB based radio link monitoring |  |
| 12 | RLM OOS with SSB in FR2 |  |
| 13 | RLM IS with SSB in FR1 |  |
| 14 | RLM IS with SSB in FR2 |  |
| 15 | RLM scheduling restriction in FR2 | 12.3.1.6 Scheduling availability of IAB-MT during radio link monitoring |  |
| 16 | RLM OOS with CSI-RS in FR1 | 12.3.1.3 Requirements for CSI-RS based radio link monitoring |  |
| 17 | RLM OOS with CSI-RS in FR2 |  |
| 18 | RLM IS with CSI-RS in FR1 |  |
| 19 | RLM IS with CSI-RS in FR2 |  |
| 20 | Beam Failure Detection and Link Recovery with SSB in FR1 | 12.3.2.2 Requirements for SSB based beam failure detection12.3.2.5 Requirements for SSB based candidate beam detection |  |
| 21 | Beam Failure Detection and Link Recovery with CSI-RS in FR1 | 12.3.2.3 Requirements for CSI-RS based beam failure detection2.3.2.6 Requirements for CSI-RS based candidate beam detection |  |
| 22 | Scheduling restriction during BFD and link recovery in FR2 | 12.3.2.7 Scheduling availability of IAB-MT during beam failure detection12.3.2.8 Scheduling availability of IAB-MT during candidate beam detection |  |

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| [R4-2016383](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016383.zip) | Nokia, Nokia Shanghai Bell | 1. Test cases for IAB RRM requirements will be defined only for IAB-MT.
2. Use NR RRM test cases as baseline for IAB-MT RRM test cases.
3. Specify IAB-MT RRM test cases with adding the reference to related NR test cases with additional clarification based on the different part in the core requirements between IAB-MT and NR.
4. Create a new Annex in TS 38.174 for IAB-MT RRM test cases
 |
| [R4-2016594](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016594.zip) | ZTE Corporation, Qualcomm Incorporated | **Proposal 1: If core requirements are directly referenced from 38.133, corresponding test cases can take UE test cases as a base line with different configurations for IAB-MTs.****Proposal 2: To cover all scenarios, specify all test cases in both FR1 and FR2 if applicable.****Proposal 3: Discuss the following two options: 1) create a new Annex in TS 38.174 [1] to contain the test cases, 2) have a dedicated specification for all test cases (RRM and RF and demod).****Proposal 4: Discuss and finalize the above work split. Also discuss and finalize on the skeleton of the test cases in the specification.**

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| --- | --- |
| **Draft CRs / Big CRs** | **Source Company** |
| **RRC\_CONNECTED state mobility for IAB-MTs** |  |
| **Timing** |  |
| **RLM** |  |
| **Link recovery** |  |
| **Test configurations** |  |

**Proposal 5: Discuss and settle down on the test configurations first.** |

## Open issues summary

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

### Sub-topic 2-1 Scope of test cases

**Issue 2-1-1: General scope / test cases with DU part disabled**

* Proposals
	+ Option 1: Only RRM performance requirements for IAB-MT are needed and the IAB-MT shall be tested with DU part disabled. (Huawei)
	+ Option 2: Test cases for IAB RRM requirements will be defined only for IAB-MT. (Nokia)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-2: TC for different IAB types**

* Proposals
	+ Option 1: Different types of IAB (type 1-H, type 1-O and type 2-O) shall be considered to decide the test methodology (conducted/OTA). Use conducted testing for IAB type 1-H and OTA testing for IAB type 1-O and 2-O. (Huawei)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-3: Operation mode for TCs**

* Proposals
	+ Option 1: Define test cases for RRM requirements under NR SA. (Huawei)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-4: Test cases compare to UE test cases**

* Proposals
	+ Option 1: RAN4 to consider simplifying the RRM requirements testing for IAB-MT to define typical scenarios and key configurations for RRM requirements and taking TS 38.133 as the baseline. (Huawei)
	+ Option 2: Take UE test cases as baseline. (Nokia, ZTE, Qualcomm)
	+ Option 2a: Specify IAB-MT RRM test cases with adding the reference to related NR test cases with additional clarification based on the different part in the core requirements between IAB-MT and NR. (Nokia)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-5: Local / wide area IAB-MTs**

* Proposals
	+ Option 1: The performance requirements shall be differentiated between wide area IAB-MT and local area IAB-MT if needed. (Huawei)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-6: Test cases for RRC re-establishment**

* Proposals
	+ Option 1: As there is no cell reselection and RRM measurement requirements, only unknown target cell should be considered in the testing. (Huawei)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-7: Test cases for random access**

* Proposals
	+ Option 1: It is suggested not to define separate test cases of RA for IAB-MT. (Huawei)
* Recommended WF
	+ Discussions are needed

**Issue 2-1-8: Frequency range for test cases**

* Proposals
	+ Option 1: RRM tests are defined in both FR1 and FR2 to verify all IAB-MT requirements defined in TS 38.174. (Ericsson, ZTE, Qualcomm)
* Recommended WF
	+ Discussions are needed

### Sub-topic 2-2 Where to capture the TCs and work split

**Issue 2-2-1: Responsible working group**

* Proposals
	+ Option 1: The RRM performance testing requirements shall be defined and maintained in RAN4. (Huawei)
* Recommended WF
	+ Discussions are needed

**Issue 2-2-2: Where to capture TCs**

* Proposals
	+ Option 1: Align with the conclusion from RF and Demod sessions and include all performance requirements in a single dedicated spec for IAB. (Huawei)
	+ Option 2: New Annex in TS 38.174 (Nokia, Ericsson)
		- Option 2a: New annex in TS 38.174 shall contain IAB-MT RRM test configuration, RRM tests and conditions for bands in which IAB-MT requirements apply. (Ericsson)
* Recommended WF
	+ Discussions are needed

**Issue 2-2-3: At what level do we split the CR work**

* Proposals
	+ Option 1: Only split for different features (content in the table can be adjusted)

|  |  |
| --- | --- |
| **Draft CRs / Big CRs** | **Source Company** |
| **RRC\_CONNECTED state mobility for IAB-MTs** |  |
| **Timing** |  |
| **RLM** |  |
| **Link recovery** |  |
| **Test configurations** |  |

* + Option 2: Split at a detailed level (content in the table can be adjusted)

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| --- | --- | --- | --- |
| **No** | **RRM Test cases** | **Related RRM Requirements**  | **Volunteer company** |
| 1 | RRC Re-establishment in FR1 | 12.1.1.1 SA: RRC Re-establishment | Ericsson |
| 2 | RRC Re-establishment in FR2 | Ericsson |
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|  |  |  |
| 5 | RRC Connection Release with Redirection to NR in FR1 | 12.1.1.3 SA: RRC Connection Release with Redirection to NR |  |
| 6 | RRC Connection Release with Redirection to NR in FR2 |  |
| 7 | IAB-MT transmit timing in FR1 | 12.2.1 IAB-MT transmit timing |  |
| 8 | IAB-MT transmit timing in FR2 |  |
| 9 | IAB-MT timing advance in FR1 | 12.2.3 IAB-MT timing advance |  |
| 10 | IAB-MT timing advance in FR2 |  |
| 11 | RLM OOS with SSB in FR1 | 12.3.1.2 Requirements for SSB based radio link monitoring |  |
| 12 | RLM OOS with SSB in FR2 |  |
| 13 | RLM IS with SSB in FR1 |  |
| 14 | RLM IS with SSB in FR2 |  |
| 15 |  |  |  |
| 16 | RLM OOS with CSI-RS in FR1 | 12.3.1.3 Requirements for CSI-RS based radio link monitoring |  |
| 17 | RLM OOS with CSI-RS in FR2 |  |
| 18 | RLM IS with CSI-RS in FR1 |  |
| 19 | RLM IS with CSI-RS in FR2 |  |
| 20 | Beam Failure Detection and Link Recovery with SSB in FR1 | 12.3.2.2 Requirements for SSB based beam failure detection12.3.2.5 Requirements for SSB based candidate beam detection |  |
| 21 | Beam Failure Detection and Link Recovery with CSI-RS in FR1 | 12.3.2.3 Requirements for CSI-RS based beam failure detection2.3.2.6 Requirements for CSI-RS based candidate beam detection |  |
|  |  |  |  |

* Recommended WF
	+ Discussions are needed

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Issue 2-1-1: We agree with option 1. Option 2 is subset of option 1. Issue 2-1-2: In principle the proposal is ok since IAB can have one of the 3 possible types. But we want to prioritize tests for Type 1-H and Type 2-0 i.e. conducted tests for Type 1-H and OTA tests for 2-O. This means we down prioritize OTA tests for type 1-O. This will simplify RRM tests which can be reused from UE RRM tests. Issue 2-1-3: Agree with option 1. Issue 2-1-4: I do not see any difference between option 1 and option 2. Both aim to define IAB-MT RRM tests using TS 38.133 RRM tests. We are fine with options 1 and 2. Option 2a is not clear. We cannot define IAB-MT RRM tests by adding any reference in 38.133 RRM tests.Issue 2-1-5: Option 1 is not clear. Does it mean having separate tests for LA and WA IAB-MT? Same test can be used for both LA and WA IAB-MT if the requirement applies to both classes e.g. Timing. Otherwise the test should apply for particular IAB-MT class e.g. RLM and BM tests only for LA. Issue 2-1-6: Option 1 is fine. It is feasible to verify RRC re-establishment requirement only for LA IAB-MT since there is no RLM requirements for WA IAB-MT. Therefore this test should be limited to LA IAB-MT.Issue 2-1-7: Agree with option 1.Issue 2-1-8: Apart from FR1 and FR2 there are also IAB types. So FR1 tests should be for IAB type 1-H and FR2 tests should be for IAB type 2-O. No tests for IAB type 1-O (see our comments on issue 2-1-2). Furthermore based on our comments on issues 2-1-6 and 2-1-7 we suggest to modify option 1 as follows: “RRM tests are defined in FR1 for IAB type 1-H and FR2 for IAB type 2-O to verify all IAB-MT requirements defined in TS 38.174 that are also feasible to test.Issue 2-2-1: Support option 1. There is no other option. IAB is a network node. RAN5 does conformance testing for UE not for any network node.Issue 2-2-2: We support options 2 and 2a. RAN4 develops conformance tests for RF and demodulation for network node (e.g. BS, repeater). But RAN4 does not develop conformance tests for RRM rather RAN4 RRM tests assist conformance testing in other group or outside 3GPP. Therefore, it is more realistic to define RRM tests similar to UE RRM tests in an annex of TS 38.174.Issue 2-2-2: In our view it is better if the same company takes all tests for the same requirement. The way we split also depends on the number of volunteer companies. In table 1 I think we should also add conditions to capture the signal levels in annex of TS 38.174.  |
| Huawei | **Issue 2-1-1: General scope / test cases with DU part disabled**Option 1 and option 2 are generally same. We prefer option 1.**Issue 2-1-2: TC for different IAB types**We support the proposal but also agree with Ericsson’s comments that the test methodology for type 1-H and type 2-O is clear based on 38.133 RRM testing.**Issue 2-1-3: Operation mode for TCs**Agree with option 1. RAN4 should prioritize RRM testing under NR SA as there is no clear framework for EN-DC in RAN4 currently. **Issue 2-1-4: Test cases compare to UE test cases**We prefer option 1.**Issue 2-1-5: Local / wide area IAB-MTs**It is obvious that the requirements only targeting for certain type of IAB-MT will only have test cases for the particular IAB-MT type. But are not sure for the “common test cases”, whether there will be any difference between different types of IAB-MT (e.g. configurations).**Issue 2-1-6: Test cases for RRC re-establishment**As analysis in our paper, it is feasible to test the intra-f RRC re-establishment to an unknown Cell. And also, we haven’t found reliable mechanism to trigger RRC re-establishment in the testing when there is no RLM requirements for wide area IAB. We support to only test the RRC re-establishment requirement for local area IAB for intra-f unknown Cell.**Issue 2-1-7: Test cases for random access**Support the option. As analyzed in our paper, the RA testing is mainly to test UE behavior when there is conflicts during RA process and the power ramping is tested. However, for IAB-MT there is no relative and absolute power accuracy (especially for WA IAB-MT), and the density of IAB-MT is much lower than original UE and there are IAB-MT specific RACH resource for IAB-MT defined in RAN1. So we believe there is no need to test RA process as original UE. The RACH process could be tested in RRC re-establishment and Release with re-direction testing which ended with preamble transmission.**Issue 2-2-1: Responsible working group**We support option 1. There is agreement in demod session that the complete work will be down in RAN4, and we believe RRM testing should keep the same principle, and no RAN5’s work should be involved. **Issue 2-2-2: Where to capture TCs**We have no strong views on how to organizing the performance testing spec. **Issue 2-2-3: At what level do we split the CR work**We suggested to postpone the work split in the 2nd round as there are some general issues to be settled.  |
| Samsung | **Issue 2-1-3: Operation mode for TCs**Agree with option 1. **Issue 2-1-4: Test cases compare to UE test cases**Prefer option 1.**Issue 2-2-1: Responsible working group**Support option 1.**Issue 2-2-2: Where to capture TCs**General test cases (as UE’s in 38.133) should be captured in 38.174 and conformance test should be captured in a new spec for IAB as RF requirement. |
| Nokia | Sub-topic 2-1 Scope of test cases**Issue 2-1-1: General scope / test cases with DU part disabled**Option 1 and Option 2 are very similar. We are fine with Option 1. **Issue 2-1-2: TC for different IAB types**We can follow the way in 38.133 RRM test. **Issue 2-1-3: Operation mode for TCs**We are fine with Option 1. **Issue 2-1-4: Test cases compare to UE test cases**Our intention is to simplify the work. We suggest to use TS38.133 UE test cases as the baseline for IAB-MTs. Since IAB-MTs core requirements are very similar to UE core requirements, when we design IAB-MTs test cases, we can define the general specific test configurations for IAB-MTs and add reference to 38.133 UE test cases for IAB-MTs in 38.174 if both of UE and IAB-MT core requirements are very similar. some additional clarification/configuration for IAB-MTs test cases could be added if the IAB-MTs core requirements are different from UE core requirements. **Issue 2-1-5: Local / wide area IAB-MTs**Generally, we should define common test cases for IAB-MTs including local and wide area IAB-MTs, except there have different core requirements for local and wide area IAB-MTs. **Issue 2-1-6: Test cases for RRC re-establishment**We are fine with Option 1.**Issue 2-1-7: Test cases for random access**We are fine with Option 1.**Issue 2-1-8: Frequency range for test cases**We support Option 1. IAB-MT RRM tests should be defined for both FR1 and FR2. Sub-topic 2-2 Where to capture the TCs and work split**Issue 2-2-1: Responsible working group**We support Option 1. RAN5 will focus on UE conformance testing and IAB is not in the RAN5 work list. **Issue 2-2-2: Where to capture TCs**We support Option 2. Test cases will be defined in 38.174. The RRM conformance test part which is the similar part for UE in RAN5 can be aligned conformance test in RF and Demod in a single dedicated specification for IAB. **Issue 2-2-3: At what level do we split the CR work**Depends on the conclusion in sub-topic 2-1, if it is agreed that IAB-MTs TCs will be based on 38.133 UE RRM test cases and add the related 38.133 TCs reference for most of IAB-MT test cases in 38.174 instead of copy-paste, then we can split on high level. |

### 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** |
| [R4-2014184](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014184.zip) |  Nokia: CR can be come back later. We need focus on general rule like how to define the RRM performance requirements for IAB firstly. |
| Company B |
|  |
| [R4-2016172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016172.zip) |  Nokia: CR can be come back later. We need focus on general rule like how to define the RRM performance requirements for IAB firstly. |
| Company B |
|  |

## 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**  |
| **Issue 2-1-1** | *Tentative agreements:* Only RRM performance requirements for IAB-MT are needed and the IAB-MT shall be tested with DU part disabled.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-1-2** | *Tentative agreements:* Use conducted testing for IAB type 1-H and OTA testing for IAB type 2-O. *Recommendations for 2nd round:* Discuss further if tests for IAB type 1-O is needed and if yes, whether to use OTA testing for IAB type 1-O |
| **Issue 2-1-3** | *Tentative agreements:* Define test cases for RRM requirements under NR SA.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-1-4** | *Tentative agreements:* Take UE test cases as baseline when defining test cases for IAB-MTs.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-1-5** | *Tentative agreements:* The performance requirements shall be differentiated between wide area IAB-MT and local area IAB-MT if needed.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-1-6** | *Tentative agreements:* Only unknown target cell should be considered in the testing and only local-area IAB-MT to be tested.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-1-7** | *Tentative agreements:* Don’t define separate test cases of random access for IAB-MT.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-1-8** | *Tentative agreements:* RRM tests are defined in both FR1 and FR2 to verify all IAB-MT requirements defined in TS 38.174.*Recommendations for 2nd round:* Companies please check if the following proposal from Ericsson is agreeable: RRM tests are defined in FR1 for IAB type 1-H and FR2 for IAB type 2-O to verify all IAB-MT requirements defined in TS 38.174 that are also feasible to test.*Moderator: this would mean no test for IAB type 1-O.* |
| **Issue 2-2-1** | *Tentative agreements:* The RRM performance testing requirements shall be defined and maintained in RAN4, and no RAN5 work to be involved.*Recommendations for 2nd round:* No need to further discuss. |
| **Issue 2-2-2** | *Candidate option: Capture performance test cases in TS 38.174.* *FFS whether RAN4 defines RRM conformance tests. If yes, where to capture RRM conformance tests. Moderator note: RF and Demod decided to capture conformance tests in a dedicated spec.**Recommendations for 2nd round:* Please discuss if the option above is agreeable. |
| **Issue 2-2-3** | *Candidate options:* Option 1: Only split for different features (content in the table can be adjusted)Option 2: Split at a detailed level (content in the table can be adjusted)*Recommendations for 2nd round:* Further discuss. |

*Suggestion on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 | WF on test cases for IAB-MTs | ZTE Corporation |

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2014184](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014184.zip) | *To be revised* |
| [R4-2016172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016172.zip) | *To be revised* |

## Discussion on 2nd round (if applicable)

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  | **Issue 2-1-2:****Issue 2-1-8:****Issue 2-2-2:****Issue 2-2-3:** |
| **ZTE** | **Issue 2-1-2:** The type of IAB nodes (1-H or 1-O) depend on the declarition of manufacturers. If we don’t define tests for IAB type 1-O, then what will happen if the vendors declare that the IAB node is of type 1-O? In our view we should define test cases for all three types (1-H, 1-O and 2-O). We’re willing to discuss about the scope of each type.**Issue 2-1-8:** We think that test cases for IAB type 1-O is necessary.**Issue 2-2-2:** If conformance tests are to be defined, we suggest to align with RF and Demod to capture them in a dedicated new spec.**Issue 2-2-3:** We don’t have strong view here. As long as the work plan is clear and effective we’re fine. Since we already submitted a draft CR on timing, we can take care of that part. |
| **Huawei** | **Issue 2-1-2 & Issue 2-1-8:**We believe issue 2-1-2 and issue 2-1-8 should be considered together. The issue is whether to test IAB type 1-O and what is the test methodology if it is needed. From our point of views, it is not feasible to perform conduced testing for IAB type 1-O as what we have for UE in FR1. So we are fine to only focus on IAB type 1-H and 2-O or further discuss the test methodology.**Issue 2-2-2:**This issue is triggered from the discussion in another thread [309], and it is also related to RF and demod session. One thing which is not very clear to us is that it seems one option is to have two performance spec for IAB: one to capture the test cases (as the annex in 38.133) and one for conformance testing spec. From our understanding, there is no need to create two performance testing spec within the WI. For BS requirements and conformance testing spec 38.104 and 38.141, the performance requirements in 38.104 is more like what we have defined as the core part requirements, and the conformance testing spec 38.141 is to design test to verify the requirements. So for IAB RRM part, it is a little bit strange to have two spec by saying one for test cases and the other for conformance testing. So at first we believe there should be only one performance testing spec for IAB RRM apart, otherwise there will be lots of redundant copy-paste works. As discussed in the 1st round, companies agreed to take 38.133 annex as the baseline with some necessary modifications and simplifications. So if we take 38.133 annex as the baseline and keep the same level to define RRM testing, it is sufficient to conduct testing compared with the BS conformance testing spec. So we are fine to not to define conformance testing spec for IAB RRM and only define test in the annex in 37.174. **Issue 2-2-3:**We prefer to have a clear test cases list for companies to prepare the corresponding CRs in the next meeting. We made some modifications on the table in 2.2.2 Issue 2-2-3 option 2. We would also like to let companies to check whether the list is ok. We would also like to paper the CR for RRC release with redirection in the next meeting.  |
| Ericsson | **Issue 2-1-2:** We support the tentative agreement. IAB type 1-O which uses FR1 bands cannot have conducted tests. But IAB-MT tests are based on UE RRM tests. In FR1 all tests are conducted. Therefore, it is not feasible to have conduced testing for IAB type 1-O. Regarding ZTE question if IAB type 1-O is declared: having no RRM tests is not a big issue. There are core RRM requirements. In RAN4 we don’t have competence to develop OTA RRM tests in FR1. If necessary propriety tests can be done but this is outside RAN4 scope.**Issue 2-1-8:** Based on our arguments provided under issue 2-1-2, RRM tests can be defined for IAB type 1-H and IAB type 2-O. So no tests for IAB type 1-O.**Issue 2-2-2:** We agree with HW that RRM tests in annex of 38.174 are sufficient along the line of UE RRM tests in 38.133 annex. RAN4 does not develop RRM conformance tests so it is not even feasible to do it for IAB-MT. Therefore we do not support defining IAB-MT RRM tests also in conformance test spec. In RF and demod the situation is different. RAN4 develops conformance tests for BS RF and BS demod. Therefore, RAN4 can use BS conformance principles to define IAB RF and demod conformance tests. **Issue 2-2-3:** We support agreement on detailed test case list (option 2). We are fine with the test case list updated by HW in issue 2-2-2, option 2. But we also need work split on test configurations and conditions for bands in the annex.  |
| ZTE | **Issue 2-1-2, Issue 2-1-8:** We can agree on no test cases for IAB type 1-O.**Issue 2-2-2:** After checking companies view, we think that we can limit test cases only to TS 38.174 and not to have test cases defined elsewhere. |
| Nokia | **Issue 2-1-2:** we are fine with the tentative agreement.**Issue 2-1-8:** we are fine with the tentative agreement.**Issue 2-2-2**: we agree that RRM performance test cases should defined in annex of 38.174 which is the same way as for UE in 38.133. RRM conformance tests should defined in the same specification as for IAB RF and demod conformance tests if it is needed to define.**Issue 2-2-3:** Generally we are fine with the updated table for the test case list, one question, why no beam failure detection in FR2? Since we can see that most of the case will almost the same as 38.133, we think we can focus on high level split work. |
| Ericsson2 | **Issue 2-2-2:** Question to Nokia on their comments, “RRM conformance tests should defined in the same specification as for IAB RF and demod conformance tests if it is needed to define”.Can Nokia clarify if Nokia wants also conformance tests since from above Nokia position is not clear. I see all other companies support RRM tests only in annex of 38.174.  |
| Nokia2 | To Ericsson, We think we need to have RRM conformance test. If RRM does not have conformance test, verification of the RRM test cases will be a problem. Seems RAN5 has no plan on IAB topic, they will only focus UE, the idea is to adapt RAN5 work and include in RAN4 specs.  |

### CRs/TPs

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| **CR/TP number** | **CRs/TPs Comment Collection** |
| Revised [R4-2014184](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014184.zip) | Companies please trigger a separate discussion using a dedicated email thread under thread 209 for this CR. |
| Revised [R4-2016172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016172.zip) | Companies please trigger a separate discussion using a dedicated email thread under thread 209 for this CR. |

## 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”* |