**3GPP TSG-RAN WG4 Meeting #** **98-e R4-2103691**

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

**Agenda item:** 7.4.4, 7.4.5

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [98e][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** |
| **[R4-2100041](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100041.zip)** | ZTE Corporation | **Observation 1:** It was not the intention to add gap based requirements rather a mistake when preparing the TP.  **Proposal 1: Remove gap aspects from requirements in TS 38.174.** |
| **[R4-2100042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100042.zip)** | ZTE Corporation | [CR] IAB Core Maintenance |
| **[R4-2101626](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101626.zip)** | Huawei, HiSilicon | **Proposal 1: Remove the gap aspects from the requirements and clarify that the evaluation period could be longer when MG is configured.** |
| **[R4-2101627](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101627.zip)** | Huawei, HiSilicon | CR on RRM core requirements maintenance for MG for IAB |
| **[R4-2102487](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102487.zip)** | Nokia, Nokia Shanghai Bell | **Proposal 1: Remove measurement gap aspects from requirements in 38.174** |
| **[R4-2102488](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102488.zip)** | Nokia, Nokia Shanghai Bell | CR on removing gap aspects from IAB-MT RRM requirements |
| **[R4-2102635](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102635.zip)** | Ericsson | * **Observation 1:** 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 1:** Specify one applicable measurement gap configuration for local area IAB-MT for meeting RLM and link recovery requirements in TS 38.174 as shown in table 1. * **Table 1: Measurement Gap Pattern Configurations**  |  |  |  | | --- | --- | --- | | **Gap Pattern Id** | **Measurement Gap Length (MGL, ms)** | **Measurement Gap Repetition Period (MGRP, ms)** | | 0 | 6 | 40 | |
| **[R4-2102636](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102636.zip)** | Ericsson | Measurement gaps for Local Area IAB-MT |

## Open issues summary

### Sub-topic 1-1

**Issue 1-1: Whether to remove gap patterns for IAB-MTs**

* Proposals
  + Option 1: Yes (ZTE, Huawei, Nokia)
    - Option 1a: Yes, and clarify that the evaluation period could be longer when MG is configured (Huawei)
  + Option 2: No, specify that gap pattern 0 applies (Ericsson)
* Recommended WF
  + Can Option 1 be agreed?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Issue 1-1: Support Option 1 to simply remove the gap patterns. |
| Huawei | Issue 1-1-1: We support option 1/1a. |
| Ericsson | We are OK with option 1 since most companies prefer it. But then we should avoid any reference to measurement gaps since there will be no gaps defined in 38.174. Therefore, we want to avoid option 1a. |
| Nokia | Issue 1-1: Support option 1. As mobility is not supported for IAB, no handover requirements are specified for IAB-MTs. We do not see a need to define measurement reporting requirements and the related measurement gap configurations for Rel-16 IAB. |

### 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** |
| **[R4-2100042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100042.zip)** | Company A |
| Company B |
|  |
| **[R4-2101627](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101627.zip)** | Ericsson: suggest not to have any gap related aspects if we go for option 1 |
| Company B |
|  |
| **[R4-2102488](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102488.zip)** |  |
|  |
|  |
| **[R4-2102636](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102636.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:* Remove gap patterns for IAB-MTs completely from TS 38.174 RRM requirements.  *Recommendations for 2nd round:* No need to further discuss. |

*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** |
| **[R4-2100042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100042.zip)** | *To be revised.* |
| **[R4-2101627](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101627.zip)** | *Merged into* **[R4-2100042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100042.zip)** |
| **[R4-2102488](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102488.zip)** | *Merged into* **[R4-2100042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100042.zip)** |
| **[R4-2102636](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102636.zip)** | *Not pursued.* |

## 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** |
| R4-2104057 | *Agreed* |

# Topic #2: General aspects of 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** |
| **[R4-2100253](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100253.zip)** | ZTE Corporation | **Proposal 1: Discuss and finalize the above work split. Also discuss and finalize on the skeleton of the test cases in the specification.**   |  |  | | --- | --- | | **Draft CRs / Big CRs** | **Source Company** | | **RRC\_CONNECTED state mobility for IAB-MTs** |  | | **Timing** |  | | **RLM** |  | | **Link recovery** |  | | **Test configurations** |  |   **Proposal 2: Discuss and settle down on the test configurations first.**  **Proposal 3: Test configurations for IAB-MTs shall take that of R16 Ues as baseline. IAB-MTs are to be tested under same test configurations which are specified for R16 Ues.** |
| **[R4-2101628](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101628.zip)** | Huawei, HiSilicon | **Proposal 1: The test cases and configurations related to the DRX should be removed.**  **Proposal 2: The test cases and configurations related to DC and CA shall be removed.**  **Observation 1: It is preferred to follow the BS manner that the performance could be evaluated using one supported TDD patterns.**  **Proposal 4: It is suggested that the TDD pattern and related configurations shall be configurable and left for implementation including:**   * **DL/UL scheduling related configuration** * **PRACH and SRS configuration** * **SSB/CSI-RS offset**   **Proposal 5: The performance requirements for IAB RRM are independent with the UE conformance testing spec and the corresponding part shall be removed when taking the TS 38.133 annex as the baseline.**  **Proposal 6: AoA related configurations are based on declaration. Only indicate the number of AoAs in the test cases.**  **Proposal 7: It is suggested not to have separate test cases for timing advance for both type of IAB-MT.**  **Proposal 8: Only define performance test cases for LA IAB-MT.**   |  |  |  |  | | --- | --- | --- | --- | | **RRM Test cases** | **Related RRM Requirements** | **Applicability** | **Companies** | | RRC Re-establishment in FR1 | 12.1.1.1 SA: RRC Re-establishment | 1-H LA |  | | RRC Re-establishment in FR2 | 2-O LA | | RRC Connection Release with Redirection to NR in FR1 | 12.1.1.3 SA: RRC Connection Release with Redirection to NR | 1-H LA | Huawei | | RRC Connection Release with Redirection to NR in FR2 | 2-O LA | | IAB-MT transmit timing in FR1 | 12.2.1 IAB-MT transmit timing | 1-H LA |  | | IAB-MT transmit timing in FR2 | 2-O LA | | RLM OOS with SSB in FR1 | 12.3.1.2 Requirements for SSB based radio link monitoring | 1-H LA |  | | RLM OOS with SSB in FR2 | 2-O LA | | RLM IS with SSB in FR1 | 1-H LA | | RLM IS with SSB in FR2 | 2-O LA | | RLM OOS with CSI-RS in FR1 | 12.3.1.3 Requirements for CSI-RS based radio link monitoring | 1-H LA |  | | RLM OOS with CSI-RS in FR2 | 2-O LA | | RLM IS with CSI-RS in FR1 | 1-H LA | | RLM IS with CSI-RS in FR2 | 2-O LA | | Beam Failure Detection and Link Recovery with SSB in FR1 | 12.3.2.2 Requirements for SSB based beam failure detection  12.3.2.5 Requirements for SSB based candidate beam detection | 1-H LA |  | | Beam Failure Detection and Link Recovery with CSI-RS in FR1 | 12.3.2.3 Requirements for CSI-RS based beam failure detection  12.3.2.6 Requirements for CSI-RS based candidate beam detection | 1-H LA |  | | Beam Failure Detection and Link Recovery with SSB in FR2 | 12.3.2.2 Requirements for SSB based beam failure detection  12.3.2.5 Requirements for SSB based candidate beam detection | 2-O LA |  | | Beam Failure Detection and Link Recovery with CSI-RS in FR2 | 12.3.2.3 Requirements for CSI-RS based beam failure detection  12.3.2.6 Requirements for CSI-RS based candidate beam detection | 2-O LA |  |   **Proposal 9: Define the test cases in the above Table I for IAB.** |
| **[R4-2101629](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101629.zip)** | Huawei, HiSilicon | draftCR to introduce test configurations for IAB-MT RRM performance test |
| **[R4-2102489](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102489.zip)** | Nokia, Nokia Shanghai Bell | Proposal 1: High level split for RRM IAB-MT test cases could be defined as below:   |  |  |  |  | | --- | --- | --- | --- | | **Draft CRs / Big CRs for the test cases** | **Related RRM core requirements** | **Applicable Rule** | **Volunteer Company** | | **RRC\_CONNECTED state mobility for IAB-MTs** | 12.1.1.1 SA: RRC Re-establishment  12.1.1.3 SA: RRC Connection Release with Redirection | Use 38.133 RLM test cases as baseline and extend the evaluation period |  | | **Timing** | 12.2.1 IAB-MT transmit timing  12.2.3 IAB-MT timing advance | Refer to 38.133 link recovery test cases in SA |  | | **RLM** | 12.3.1 Radio Link Monitoring | Use 38.133 RLM test cases as baseline and extend the evaluation period | Nokia | | **Link recovery** | 12.3.2 Link Recovery Procedure | Refer to 38.133 link recovery test cases in SA |  | | **Test configurations** |  | Use 38.133 test configuration as baseline, define the IAB-MT’s specific test configurations in 38.174, others can refer to 38.133 directly. |  |   **Proposal 2: Use UE test configurations as baseline and define the specific and simplified test configurations for IAB-MT.** |
| **[R4-2102640](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102640.zip)** | Ericsson | * **Proposal 1:** In IAB-MT RRM test requirements are derived using the corresponding configuration parameters as example. * **Proposal 2:** The actual IAB-MT RRM test can be conducted by any set of configuration parameters and corresponding test requirements shall be based on the actual configuration parameters used in the test. * **Proposal 3:** In IAB-MT RRM tests only one serving cell shall be considered. |
| **[R4-2102936](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102936.zip)** | Qualcomm CDMA Technologies | **Observation: more study is needed to find a compromise between fulfilling the IAB-RRM performance requirement and the time it takes to publish the performance specification.** |

## 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 Test configurations

**Issue 2-1-1: Principles for test configurations**

* Proposals
  + Option 1: Test configurations for IAB-MTs shall take that of R16 Ues as baseline. IAB-MTs are to be tested under specific and simplified test configurations which are specified for R16 Ues. (ZTE, Nokia)
* Recommended WF
  + Is Option 1 agreeable as a general principle?

**Issue 2-1-2: TDD configuration**

* Proposals
  + Option 1 (Huawei, Ericsson): Tests can be done for any TDD configuration. TDD pattern and related configurations shall be configurable and left for implementation including
    - DL/UL scheduling related configuration
    - PRACH and SRS configuration
    - SSB/CSI-RSconfiguration
* Recommended WF
  + Discussions are needed

**Issue 2-1-3: Number of serving cells**

* Proposals
  + Option 1: In IAB-MT RRM tests only one serving cell shall be considered. However, there can be more than one cell in some tests to account for a target cell e.g. RRC re-establishment and RRC release with redirection. (Ericsson)
* Recommended WF
  + Discussions are needed

**Issue 2-1-4: Requirements in test cases**

* Proposals
  + Option 1: In IAB-MT RRM test requirements are derived using the corresponding configuration parameters as example. The actual IAB-MT RRM test can be conducted by any set of configuration parameters and corresponding test requirements shall be based on the actual configuration parameters used in the test. (Huawei, Ericsson)
* Recommended WF
  + Can Option 1 be agreed?

**Issue 2-1-5: AoA**

* Proposals
  + Option 1: AoA related configurations are based on declaration. Only indicate the number of AoAs in the test cases. (Huawei)
* Recommended WF
  + Discussions are needed

### Sub-topic 2-2 Scope and Work split

**Issue 2-2-1: DRX, CA and DC**

* Proposals
  + Option 1: No test cases and configurations defined with DRX, CA or DC. (Huawei)
* Recommended WF
  + Can Option 1 be agreed?

**Issue 2-2-2: Conformance tests**

* Proposals
  + Option 1: The performance requirements for IAB RRM are independent with the UE conformance testing spec and the corresponding part shall be removed when taking the TS 38.133 annex as the baseline. (Huawei)
* Recommended WF
  + As previously agreed, no conformance tests are specified for IAB-MTs. If that’s what Option 1 is proposing then no need to further discuss.

**Issue 2-2-3: Timing advance**

* Proposals
  + Option 1: Not to have separate test cases for timing advance for both type of IAB-MT. (Huawei)
* Recommended WF
  + Discussions are needed.

**Issue 2-2-4: Applicability of test cases**

* Proposals
  + Option 1: Only define performance test cases for LA IAB-MT. (Huawei)
* Recommended WF
  + Discussions are needed.

**Issue 2-2-5: Scope and work split**

* Proposals
  + Option 1: Only split for different features (ZTE)

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

* + Option 2: (Huawei)

|  |  |  |  |
| --- | --- | --- | --- |
| **RRM Test cases** | **Related RRM Requirements** | **Applicability** | **Companies** |
| RRC Re-establishment in FR1 | 12.1.1.1 SA: RRC Re-establishment | 1-H LA |  |
| RRC Re-establishment in FR2 | 2-O LA |
| RRC Connection Release with Redirection to NR in FR1 | 12.1.1.3 SA: RRC Connection Release with Redirection to NR | 1-H LA | Huawei |
| RRC Connection Release with Redirection to NR in FR2 | 2-O LA |
| IAB-MT transmit timing in FR1 | 12.2.1 IAB-MT transmit timing | 1-H LA |  |
| IAB-MT transmit timing in FR2 | 2-O LA |
| RLM OOS with SSB in FR1 | 12.3.1.2 Requirements for SSB based radio link monitoring | 1-H LA |  |
| RLM OOS with SSB in FR2 | 2-O LA |
| RLM IS with SSB in FR1 | 1-H LA |
| RLM IS with SSB in FR2 | 2-O LA |
| RLM OOS with CSI-RS in FR1 | 12.3.1.3 Requirements for CSI-RS based radio link monitoring | 1-H LA |  |
| RLM OOS with CSI-RS in FR2 | 2-O LA |
| RLM IS with CSI-RS in FR1 | 1-H LA |
| RLM IS with CSI-RS in FR2 | 2-O LA |
| Beam Failure Detection and Link Recovery with SSB in FR1 | 12.3.2.2 Requirements for SSB based beam failure detection  12.3.2.5 Requirements for SSB based candidate beam detection | 1-H LA |  |
| Beam Failure Detection and Link Recovery with CSI-RS in FR1 | 12.3.2.3 Requirements for CSI-RS based beam failure detection  12.3.2.6 Requirements for CSI-RS based candidate beam detection | 1-H LA |  |
| Beam Failure Detection and Link Recovery with SSB in FR2 | 12.3.2.2 Requirements for SSB based beam failure detection  12.3.2.5 Requirements for SSB based candidate beam detection | 2-O LA |  |
| Beam Failure Detection and Link Recovery with CSI-RS in FR2 | 12.3.2.3 Requirements for CSI-RS based beam failure detection  12.3.2.6 Requirements for CSI-RS based candidate beam detection | 2-O LA |  |

* + Option 3 (Nokia)

|  |  |  |  |
| --- | --- | --- | --- |
| **Draft CRs / Big CRs for the test cases** | **Related RRM core requirements** | **Applicable Rule** | **Volunteer Company** |
| **RRC\_CONNECTED state mobility for IAB-MTs** | 12.1.1.1 SA: RRC Re-establishment  12.1.1.3 SA: RRC Connection Release with Redirection | Use 38.133 RLM test cases as baseline and extend the evaluation period |  |
| **Timing** | 12.2.1 IAB-MT transmit timing  12.2.3 IAB-MT timing advance | Refer to 38.133 link recovery test cases in SA |  |
| **RLM** | 12.3.1 Radio Link Monitoring | Use 38.133 RLM test cases as baseline and extend the evaluation period | Nokia |
| **Link recovery** | 12.3.2 Link Recovery Procedure | Refer to 38.133 link recovery test cases in SA |  |
| **Test configurations** |  | Use 38.133 test configuration as baseline, define the IAB-MT’s specific test configurations in 38.174, others can refer to 38.133 directly. |  |

* Recommended WF
  + Discussions are needed

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Issue 2-1-1: Support Option 1.  Issue 2-1-2: Option 1 can be agreed as a general principle.  Issue 2-1-3: We can understand the motivation but this has to be studied case by case. It’s hard to summarize a generalized rule to be captured officially.  Issue 2-1-4: We can agree to option 1.  Issue 2-1-5: We can support Option 1.  Issue 2-2-1: support Option 1.  Issue 2-2-2: Can the proponent clarify on the proposal? In the last meeting we already agreed not to define conformance tests for IAB-MTs.  Issue 2-2-3: TA is a critical setting in NR and we should have test cases for that. Don’t see any problem with specifying test cases on TA.  Issue 2-2-4: Not sure about the benefits of this proposal. The risk is that functions of WA IAB-MTs are not tested.  Issue 2-2-5: We’re fine as long as there is a clear work split for companies to prepare contributions. |
| Qualcomm | Issue 2-1-1: Agree  Issue 2-1-2: Need clarification. Is this proposal effectively suggesting no commonly agreed TDD configuration will be defined in the spec?  Issue 2-1-3: Agree  Issue 2-1-4: Need clarification. Is this proposal effectively suggesting no commonly agreed set of configuration parameters will be used for the tests?  Issue 2-1-5: Agree  Issue 2-2-1: Agree  Issue 2-2-2:  Issue 2-2-3: Timing advance is key to achieving transmit timing synchronization across IAB nodes in the same network. Thus it shall be tested.Issue 2-2-4: According to 38.174, the RRM requirements on RRC-Connected state mobility and timing apply to WA IAB as well. Thus test cases shall be defined.  Issue 2-2-5: |
| Huawei | Issue 2-1-1: We agree with the general principle, but prefer to have more concrete guidance about the test configurations.  Issue 2-1-2: We can have some TDD configurations as reference as mentioned in issue 2-1-4. But particular TDD pattern used for testing may be declared by manufacture. And the corresponding configurations as mentioned in the proposal shall be configurable and left or implementation accordingly. It should be noted that we rephrase the 3rd bullet to SSB/CSI-RS configurations to align with the proposal in our paper.  Issue 2-1-3: Agreed  Issue 2-1-4: To save efforts, most of the test configurations in TS 38.133 annex could be reused. But as mentioned in our paper, many parameters of IAB are different from UE and some are left for declarations. Thus, the corresponding configuration parameters may be different from the table which is regarded as the reference. The actually configurations may left for be configurable and the requirements are calculated accordingly.  Issue 2-1-5: Agree.  Issue 2-2-1:Agree  Issue 2-2-2: Per moderator’s suggestion. The intention of the proposal is about how to organize the test spec. As we find that there are some configurations or descriptions are referred to UE conformance spec. As agreed in previous meeting that no conformance testing will be defined for IAB-MT, the corresponding reference shall be removed to avoid ambiguities.  Issue 2-2-3: We support option 1. As mentioned in our paper, TA could be frequently adjusted during the mobility of UE or changing of DL timing, and it is crucial for UE. But for IAB-MT, which is considered as the NW node without mobility, we believe it is not a typical case for IAB-MT to changing the TA after the link is established. The transmit timing requirements can be tested in the transmit timing test cases, where UE shall set the UL timing with the TA considered. In general, TA adjustment is not common cases for IAB-MT, and it has already considered in the transmit timing cases. Thus, we propose not to have separate cases for TA.  Issue 2-2-4: We support option 1. According to the applicability of the core requirements and the agreements in previous meeting. The candidate test cases for WA-IAB are RRC re-direction and transmit timing. As mentioned in our paper, for the pre-planning node without mobility, we found RRC re-direction and changing of transmit timing are not typical or realistic scenarios for IAB-MT. For instance, we cannot find the real case that the timing of IAB-MT will change after it is deployed. Even for UE test cases, we only consider or define test cases for the common or typical cases. |
| Ericsson | 2-1-1: support option 1  2-1-2: support option 1. In the test configuration section rule is defined that the test case is defined for specific set of TDD/PRSCH/SSB/CSI etc configurations as an example. But the test can be done for any set of TDD/PRSCH/SSB/CSI etc configuration.  2-1-3: Support option 1. There are only test cases for RRC re-establishment and RRC release with redirection that require 2 cells (serving and target). All other tests can be done with serving cell only i.e. timing, RLM and BM.  2-1-4: Support option 1. This is related to issue 2-1-2. As explained that each test in the annex is defined using the same configurations as used for UE RRM tests. But this is just an example. The actual test can be done with any set of configurations.  2-1-5: Support option 1.  2-2-1: Agree with option 1  2-2-2: Only parts of annex A of 38.133 that are related to the type of tests which are being defined for IAB RRM are needed in annex of 38.174. This mainly includes test configurations (e.g. FRCs, SSB, SMTC, PRACH, SRS, BWP configurations etc). We also need conditions which are used in core and test cases.  2-2-3: OK with option 1.  2-2-4: Support option 1. We agree with Huawei that test cases for WA IAB-MT are not critical. Such tests will not lead to any benefit since beams/timing (e.g. TA) etc., are quite static. The core requirements are sufficient.  2-2-5: Slightly prefer detailed split as in Huawei proposal. The reason is that it gives clear idea which tests will be defined. However, we need to also include Test configurations and conditions. |
| Qualcomm | We want to make additional comments regarding the following open issues  Issue 2-1-2: We don’t agree with ZTE/Huawei/Ericsson’s position on this. Leaving test configuration to “implementation” does not ensure inter-operability and, to certain extent, defeats the purpose of defining performance and test requirement in 3GPP RAN4.  Issue 2-1-4: Same as issue 2-1-2. At least one commonly agreed test configuration shall be defined and used for the associated test cases.  Issue 2-2-3: We disagree with Huawei and Ericsson. From a technical point of view, Timing advance is required in order to achieve transmit timing synchronization across IAB nodes in the same network. And it is key to interoperability. Thus, it shall be tested. From a procedural point of view, TA performance requirement on all types of IAB-MT is already agreed on and defined, thus the corresponding test cases shall be defined as well.  Issue 2-2-4: We disagree with Huawei and Ericsson. From a technical point of view, WA IAB-MT includes both macro cell and micro cell scenarios, according to 38.174. Thus, it is not always pre-planned. So verifying it against performance requirement is necessary. From a procedural point of view, WA IAB performance requirement has already been agreed on and defined in RAN4 (38.174). Thus we shall follow up with appropriate test case definitions. |
| Nokia | Issue 2-1-1: Support option 1.  Issue 2-1-2: Support option 1, since option 1 is aligned with demod and RF discussions.  Issue 2-1-3: Support option 1, test can be performed on one serving cell.  Issue 2-1-4: Support option 1, since option 1 is aligned with demod and RF discussions.  Issue 2-1-5: Support option 1.  Issue 2-2-1: Support option 1  Issue 2-2-2: Agree with the WF, option 1 is aligned with the agreement that no conformance test is carried out in last meeting.  Issue 2-2-3: Agree with option 1  Issue 2-2-4: Agree with option 1  Issue 2-2-5: We would say that high level split will be easy to handle, but we do not have much strong view as we have more clear view on the test cases. We are fine to compromise if majority companies have the same view. |

### 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** |
| R4-2101629 | Ericsson: Overall it looks fine. We might need to add or update some of the test configurations. |
| Nokia: The principle looks fine. The detail configurations need further check. |
|  |

## 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:* Test configurations for IAB-MTs shall take TS 38.133 Annex as baseline. IAB-MTs are to be tested under specific and simplified test configurations which are specified in TS 38.133 Annex.  *Recommendations for 2nd round: No need to further discuss.* |
| **Issue 2-1-2**  **TDD configuration** | *Candidate options:*   * + *Option 1 (Huawei, Ericsson, ZTE, Nokia):* Tests can be done for any TDD configuration. TDD pattern and related configurations shall be configurable and left for implementation including     - DL/UL scheduling related configuration     - PRACH and SRS configuration     - SSB/CSI-RS configuration   *Option 2 (Qualcomm): Don’t leave test configurations to declaration and implementation.*  *Recommendations for 2nd round: Further discuss. Can we go with the majority view?* |
| **Issue 2-1-3** | *Tentative agreements:* In IAB-MT RRM tests only one serving cell shall be considered. However, there can be more than one cell in some tests to account for a target cell e.g. RRC re-establishment and RRC release with redirection.  *Recommendations for 2nd round: No need to further discuss.* |
| **Issue 2-1-4** | *Candidate options:*  *- Option 1 (Huawei, Ericsson, ZTE, Nokia):* In IAB-MT RRM test requirements are derived using the corresponding configuration parameters as example. The actual IAB-MT RRM test can be conducted by any set of configuration parameters and corresponding test requirements shall be based on the actual configuration parameters used in the test.  *- Option 2 (Qualcomm):* At least one commonly agreed test configuration shall be defined and used for the associated test cases.  *Recommendations for 2nd round: Further discuss. Can we go with the majority view?* |
| **Issue 2-1-5** | *Tentative agreements:* AoA related configurations are based on declaration. Only indicate the number of AoAs in the test cases.  *Recommendations for 2nd round: No need to further discuss.* |
| **Issue 2-2-1** | *Tentative agreements:* No test cases and configurations defined with DRX, CA or DC.  *Recommendations for 2nd round: No need to further discuss.* |
| **Issue 2-2-2** | *Tentative agreements:* As agreed in previous meeting that no conformance testing will be defined for IAB-MT, the corresponding reference to conformance tests shall be removed to avoid ambiguities when specifying requirements and test cases in TS 38.174.  *Recommendations for 2nd round: No need to further discuss.* |
| **Issue 2-2-3** | *Candidate options:*  *- Option 1 (Huawei, Ericsson, Nokia):* Not to have separate test cases for timing advance for both type of IAB-MT.  *- Option 2 (ZTE, Qualcomm):* Specify test cases for TA.  *Recommendations for 2nd round: No majority view here, please further discuss.* |
| **Issue 2-2-4** | *Candidate options:*  *- Option 1 (Huawei, Ericsson, Nokia):* Only define performance test cases for LA IAB-MT.  *- Option 2 (Qualcomm):* Specify test cases also for WA IAB-MT.  *Recommendations for 2nd round: Further discuss. Can we go with the majority view?* |
| **Issue 2-2-5** | *Candidate options:*   |  |  |  |  | | --- | --- | --- | --- | | **RRM Test cases** | **Related RRM Requirements** | **Applicability** | **Companies** | | RRC Re-establishment in FR1 | 12.1.1.1 SA: RRC Re-establishment | 1-H LA |  | | RRC Re-establishment in FR2 | 2-O LA | | RRC Connection Release with Redirection to NR in FR1 | 12.1.1.3 SA: RRC Connection Release with Redirection to NR | 1-H LA | Huawei | | RRC Connection Release with Redirection to NR in FR2 | 2-O LA | | IAB-MT transmit timing in FR1 | 12.2.1 IAB-MT transmit timing | 1-H LA |  | | IAB-MT transmit timing in FR2 | 2-O LA | | RLM OOS with SSB in FR1 | 12.3.1.2 Requirements for SSB based radio link monitoring | 1-H LA |  | | RLM OOS with SSB in FR2 | 2-O LA | | RLM IS with SSB in FR1 | 1-H LA | | RLM IS with SSB in FR2 | 2-O LA | | RLM OOS with CSI-RS in FR1 | 12.3.1.3 Requirements for CSI-RS based radio link monitoring | 1-H LA |  | | RLM OOS with CSI-RS in FR2 | 2-O LA | | RLM IS with CSI-RS in FR1 | 1-H LA | | RLM IS with CSI-RS in FR2 | 2-O LA | | Beam Failure Detection and Link Recovery with SSB in FR1 | 12.3.2.2 Requirements for SSB based beam failure detection  12.3.2.5 Requirements for SSB based candidate beam detection | 1-H LA |  | | Beam Failure Detection and Link Recovery with CSI-RS in FR1 | 12.3.2.3 Requirements for CSI-RS based beam failure detection  12.3.2.6 Requirements for CSI-RS based candidate beam detection | 1-H LA |  | | Beam Failure Detection and Link Recovery with SSB in FR2 | 12.3.2.2 Requirements for SSB based beam failure detection  12.3.2.5 Requirements for SSB based candidate beam detection | 2-O LA |  | | Beam Failure Detection and Link Recovery with CSI-RS in FR2 | 12.3.2.3 Requirements for CSI-RS based beam failure detection  12.3.2.6 Requirements for CSI-RS based candidate beam detection | 2-O LA |  |   *Recommendations for 2nd round: RAN4 to adopt the work split as above. Companies please check if any clauses are missing or should be removed. Update this work split according to the discussion outcome for the remaining open issues. Companies are also encouraged to volunteer to take care of test cases.* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **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** |
| R4-2101629 | *to be revised* |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | Issue 2-1-2: We support to option 1. We have some different understanding as Qualcomm’s 1st round comment. If we look though the core requirements defined for normal UE or IAB-MT, the requirements are expressed in terms of number of samples (Tssb/Tsmtc/DRX cycle, .etc). For different SSB configurations, we can get the accurate requirements accordingly. And also observed from the test cases, the test is divided in to several time intervals, and for each interval, it is started with certain conditions, such SNR level change. So it means for different TDD pattern and related configurations, the corresponding requirements is clear.  And if we go through the test cases for normal UE, there are also some variables just refer to the core requirements. In the core requirements, the uncertainty is already considered, such as the uncertainty for RACH.  For IAB which works as a network node, the TDD pattern are mainly from operator’s demand. The TDD pattern and configurations defined in TS 38.133 Annex does not mean the requirements could only be evaluated using the particular configuration. So our view is that using different TDD pattern and related configurations, the requirements could be finely evaluate accordingly, and we didn’t see the reason why it can not be left for declaration and implement.  Issue 2-1-4: We support option 1, and we believe such clarification are necessary. And actually we can not find out a single common configurations for all IAB-MT. As for IAB-MT, there are lots of parameters are declared by manufacture, such BW/SCS, sensitivity, OTA directions, dynamic range, .etc. These are defined in the spec for normal UE, thus we can figure out a common test cases setup for all UE. But for IAB-MT, for instance, we cannot make sure whether the RMC or SS-RSRP level is suitable or not as it may depends on IAB declaration and implementation. Also as explained in the issue 2-1-2, the requirements could be evaluated accordingly no matter we have a single common configuration or not. For discussion in the other session, it is also agreed that flexibility in connection / measurement setup is allowed by keeping the specified setup informative. As there is no conformance testing for IAB-MT RRM, it is more reasonable to follow the principle and keep the test cases informative.  Issue 2-2-3: We support option 1. As mentioned in 1st round comment. Actually we can not find real use case for TA adjustment for IAB-MT. Even for normal UE, we skip some test case which are not the typical cases. If companies want to evaluate the timing accuracy considering the TA, then we believe the transmit timing cases are enough. And according to the discussion in RF session, it is agreed that synchronization is not defined as according to RAN1 agreement using SSBs for synchronization is not mandatory as synchronization can be obtained also by GNSS. We even doubt whether the time related requirements should apply. But at least for the test cases part, we think it is reasonable not to have timing related test cases.  Issue 2-2-4: For the WA IAB-MT and LA IAB-MT, it is the fundamental understanding that WA \_AB-MT is BS-like node and was deployed with well planning in both RRM session and other sessions. And there is significant difference in RF requirements, such as there is no limit for output power for WA IAB, so we believe maybe it could only be deployed in a pre-planned manner. The link for WA IAB-MT is considered stable without change, and this is why we don’t have RLM/BFD/CBD requirements for WA IAB-MT. As it was also discussed that the differentiation between WA IAB and LA IAB shall be considered if need. Based on the analysis above, the test cases to consider are indeed the corner cases and may not happened, then why we take efforts to define them? For normal UE, we also only define test cases for typical cases instead of defining each cases corresponding to the core requirements one-to-one.Issue 2-2-5: We support the candidate options as the proponent company. But we believe it may related to the conclusion of the above issues. |
| Ericsson | Issue 2-1-2: Support option 1. IAB is a fixed node like BS and lot of test requirements are based on declaration and deployment.  Issue 2-1-4: Support option 1. It is related to issue 2-1-2. In the tests in the annex the test requirements are derived for certain set of configurations as an example.  Issue 2-2-3: Support option 1. TA change is related to change in position. IAB is fixed node. Once TA is set it will not change. So test cases for TA are not necessary.  Issue 2-2-4: Support option 1. In our view core requirements, which exist are sufficient. It is not interesting to check requirements for feature (e.g. timing) that is mainly static.  Issue 2-2-5: We support the test case list. Ericsson is providing test cases for RRC Re-establishment in FR1 and RRC Re-establishment in FR2. |
| ZTE | Issue 2-1-2: We support Option 1 which is that the test configurations shall be left to declaration. This is also aligned with the understanding from the RF session.  Issue 2-1-4: We support Option 1 which is that the test configurations shall be left to declaration. This is also aligned with the understanding from the RF session.  Issue 2-2-3: Fine with both options. Can go with the majority view.  Issue 2-2-4: We are fine only to define test cases for LA IAB nodes. Defining test cases for WA IAB-MTs may not be needed.  Issue 2-2-5: Support the candidate option and ZTE can take care of transmit timing. |
| Nokia | Issue 2-1-2: we support option 1. This is aligned with demod and RF session.  Issue 2-1-4: Support option 1, since option 1 is aligned with demod and RF discussions.  Issue 2-2-3: Agree with option 1  Issue 2-2-4: Agree with option 1  Issue 2-2-5: We are fine with the candidate option. Nokia prepared the test cases for SSB based RLM test cases. |
| QC (missing company name added by moderator) | Issue 2-1-2: We support Option 2. As we mentioned before, defining a commonly agreed test case is a basic requirement to ensure inter-operability. Can Huawei and others explain how interoperability can be achieved if everyone just supports whatever TDD pattern and other related configurations they want to support?  Issue 2-1-4: Same as issue 2-1-2. At least one commonly agreed test configuration shall be defined and used for the associated test cases to ensure interoperability.  Issue 2-2-3: We disagree with option 1. From a technical point of view, even if we do not leverage TA procedure for synchronization purpose, TA is required to achieve correct IAB-MT tx timing in a timely manner. This is especially true with dynamic TDD in 5G NR where the guard period configuration can change on the fly when the topology of the network changes. For example, addition of a new node, including a repeater, that results in interference situation change. From a procedural point of view, TA performance requirement on all types of IAB-MT is already agreed on and defined, thus the corresponding test cases shall be defined as well. The debate about the necessity of this requirement has been conducted multiple times during core requirement definition and agreement/conclusions reached. So there is no need to revisit.  Issue 2-2-4: We disagree not testing WA IAB. Regarding the difference between WA IAB and LA IAB, this was discussed multiple times in core requirement stage and their difference clearly documented in 38.174. Regarding Huawei’s comment, yes, it’s agreed that RLM/BFD/CBD requirements do not apply for WA IAB-MT. However, other requirements do apply to WA IAB as agreed before. Thus, we shall define corresponding test cases. |
| ZTE | Issue 2-1-4:  Question to QC:  The option we support says “In IAB-MT RRM test requirements are derived using the corresponding configuration parameters as example. The actual IAB-MT RRM test can be conducted by any set of configuration parameters and corresponding test requirements shall be based on the actual configuration parameters used in the test.’ which means there will be one set of parameters clearly defined. In our view this already gives a benchmark scheme for network operators to look at. Do you suggest that one set of parameters are defined AND such configuration must be used to test all IAB-MTs?  Issue 2-2-3 and 2-2-4: What Qualcomm mentioned is that RAN4 has agreed to define core requirements but RAN4 hasn;t agreed to define all test cases corresponding to the core requirements. It cannot be interpreted that way. |

## 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** |
| R4-2103541 | Return to |
| R4-2104069 | Return to |

# Topic #3: Specifying test cases

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2100046](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100046.zip)** | ZTE Corporation | [draft CR] Test cases for timing for IAB-MT |
| **[R4-2101630](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101630.zip)** | Huawei, HiSilicon | draftCR to introduce test cases for RRC release with redirection for IAB-MT |
| **[R4-2102490](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102490.zip)** | Nokia, Nokia Shanghai Bell | draftCR on IAB RLM test cases |
| **[R4-2102637](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102637.zip)** | Ericsson | Big CR: IAB-MT RRM test cases in 38.174 |
| **[R4-2102638](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102638.zip)** | Ericsson | * **Proposal 1:** Following test cases are defined to verify RRC re-establishment requirements in clause 12.1.1.1, TS 38.174:   1. TC1: Inter-frequency RRC Re-establishment in FR1 for LA IAB-MT and IAB type 1-H   2. TC2: Intra-frequency RRC Re-establishment in FR1 without serving cell timing for LA IAB-MT and IAB type 1-H   3. TC3: Inter-frequency RRC Re-establishment in FR2 for LA IAB-MT and IAB type 1-O   4. TC4: Intra-frequency RRC Re-establishment in FR2 without serving cell timing for LA IAB-MT and IAB type 1-O |
| **[R4-2102639](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102639.zip)** | Ericsson | RRC re-establishment tests for LA IAB-MT |

## Open issues summary

### Sub-topic 3-1

**Issue 3-1: TCs for RRC re-establishment**

* Proposals
  + Option 1: (Ericsson)
  + Following test cases are defined to verify RRC re-establishment requirements in clause 12.1.1.1, TS 38.174:
  + TC1: Inter-frequency RRC Re-establishment in FR1 for LA IAB-MT and IAB type 1-H
  + TC2: Intra-frequency RRC Re-establishment in FR1 without serving cell timing for LA IAB-MT and IAB type 1-H
  + TC3: Inter-frequency RRC Re-establishment in FR2 for LA IAB-MT and IAB type 1-O
  + TC4: Intra-frequency RRC Re-establishment in FR2 without serving cell timing for LA IAB-MT and IAB type 1-O
* Recommended WF
  + Can Option 1 be agreed?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 3-1: |

### 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.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| **[R4-2100046](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100046.zip)** | Huawei: Just some general comments to all CRs. It is suggested to focus on the general configurations and applicability first. Then we can come into details of each test cases. |
| Ericsson: Comments apply to all tests:   * section numbering in different test cases need to be aligned with the template/big CR. * In all tests we prefer to add a sentence that this test is applicable for IAB-MT class X (e.g. LA) and IAB type Y (e.g. 1-H). * We should avoid giving reference to 38.133 as this will cause confusion and also make it difficult to understand the tests. The IAB-MT RRM tests including test configurations should be fully defined in the annex of 38.174 even though tests and test configurations are based on or even identical to the UE tests. |
|  |
| **[R4-2101630](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101630.zip)** | Company A |
| Company B |
|  |
| **[R4-2102490](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102490.zip)** |  |
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| **[R4-2102637](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102637.zip)** | ZTE: In the CR it should be IAB-MT not UE transmit timing. Also, the skeleton depends on the scope of TCs which is under discussions now. Suggest to wait till the scope and work split is clear. |
| Ericsson: Agree it will be updated. Also we can remove timing advance (G.2.2.2) if there is consensus not to have separate TA test. |
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| **[R4-2102639](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102639.zip)** |  |
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## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary** |
| **Issue 3-1** | *Tentative agreements:*  Following test cases are defined to verify RRC re-establishment requirements in clause 12.1.1.1, TS 38.174:   * + TC1: Inter-frequency RRC Re-establishment in FR1 for LA IAB-MT and IAB type 1-H   + TC2: Intra-frequency RRC Re-establishment in FR1 without serving cell timing for LA IAB-MT and IAB type 1-H   + TC3: Inter-frequency RRC Re-establishment in FR2 for LA IAB-MT and IAB type 1-O   + TC4: Intra-frequency RRC Re-establishment in FR2 without serving cell timing for LA IAB-MT and IAB type 1-O   *Recommendations for 2nd round:* No comments received during the first round, which means the proposal is agreeable. No need to further discuss. |

*Recommendations on WF/LS assignment*

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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*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| **[R4-2100046](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100046.zip)** | *to be revised* |
| **[R4-2101630](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101630.zip)** | *to be revised* |
| **[R4-2102490](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102490.zip)** | *to be revised* |
| **[R4-2102637](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102637.zip)** | *to be revised* |
| **[R4-2102639](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102639.zip)** | *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 number** | **CRs/TPs Status update recommendation** |
| R4-2103542 | Return to |
| R4-2103543 | Return to |
| R4-2103544 | Return to |
| R4-2103545 | **For email approval. (decision made in the Chairman Notes)** |
| R4-2103546 | Return to |