**3GPP TSG-RAN WG4 Meeting #101-bis-e R4-2202735**

**Online Meeting, 17 January – 25 January 2022**

**Agenda item:** 6.17.3

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [101-bis-e][218] NR\_IAB\_enh\_RRM

**Document for:** Information

# Introduction

TDocs submitted to the following agenda items will be treated:

- 6.17.3 RRM core requirements

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

* 1st round: Companies discuss open issues and provide comments on the CR/TP.
* 2nd round: Finalize on the open issues and the CR/TP.

# Topic #1: RRM requirements related to timing and CLI

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

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2201206](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201206.zip)** | Huawei, Hisilicon | **Observation 1: According to RAN1’s spec, MT Tx timing in Case#6 is determined by its DU Tx timing regardless of which type of implementations.****Observation 2: The legacy transmit timing requirement is to guarantee the performance of DL timing estimation accuracy.****Proposal 1: Clarify that current transmit timing requirements apply to case#1 timing mode, and no other RRM impact of case#6 timing.****Observation 3: There is no enhancement on CLI measurement and reporting for Rel-17 eIAB compared with Rel-16 IAB based on RAN1/2 agreements.****Proposal 2: For CLI measurements by IAB-MT, no RRM requirements need to be specified as there is no enhancement on CLI measurement for Rel-17 eIAB compared with Rel-16.** |
| **[R4-2201207](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201207.zip)** | Huawei, Hisilicon | Draft CR on timing requirements for Rel-17 IAB |
| **[R4-2201405](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201405.zip)** | ZTE Corporation | **Proposal 1:** For CLI measurements by IAB-MT, no RRM requirements need to be specified. |
| **[R4-2201849](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201849.zip)** | Nokia, Nokia Shanghai Bell | **On Case#6 timing RRM requirements:**1. It is agreed in RAN4 that RF requirements for Timing error between own MT TX and DU TX should be defined for Case#6 timing. The discussion is still ongoing.
	1. At the last RAN1#107-e meeting, all of the RAN1 WID objectives were fulfilled.
	2. Case#6 timing is supported in Rel-17 and can rely on an OTA timing synchronization mechanism.
	3. The only RAN1 specification impact is that T\_delta range is updated to support Case 6 timing.
	4. IAB-MT is provided with a Timing Case Indication via MAC-CE i.e., one of {Case 1, Case 6, Case 7} for each slot.

The cell phase synchronisation accuracy for IAB-DUs is already specified in TS 38.174, Clause 12.2.42.1. RAN4 not to introduce any new RRM requirements for Case#6 timing scheme.

In Case#6 scheme, the IAB-MT UL Tx is set by the node to the timing obtained for the node’s DL Tx, i.e., it is not based directly on the first detected path (in time) of the corresponding downlink frame from the reference cell.Current IAB-MT transmit timing requirements in TS 38.174, Clause 12.2.1 cover only legacy TA-based mechanism, i.e., when IAB-MT timing is controlled by timing adjustment command from the parent node.1. RAN4 to reflect in TS 38.174, that exiting IAB-MT transmit timing requirements are applicable to Case#1 timing only.

**On CLI RRM requirements:**Rel-16 interference management frameworks (e.g. CLI, RIM) is used to handle IAB interference scenarios in Rel-17. The only agreed enhancement in RAN1 is that coordination signalling (Intended TDD DL-UL Configuration) is extended to support IAB specific UFD patterns. DFU patterns were already present in the Rel-16 IAB specifications without any impact on RAN4 RRM requirements.**Proposal 3: For CLI measurements by IAB-MT, no new RRM requirements need to be specified.** |
| **[R4-2201850](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201850.zip)** | Nokia, Nokia Shanghai Bell | TP to TS 38.174 on RRM Timing Requirements |
| **[R4-2202019](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202019.zip)** | Ericsson | **Case 1 and 7 timings:*** **Observation 1**: RAN1 has specified procedures for Case #1, Case # 6 and Case #7 timings for IAB-MT transmission timing in TS 38.213 v17.0.0.
* **Observation 2**: Case #1 timing for IAB-MT transmission timing is based on the existing UE timing advance mechanism as specified in clause 4.2, TS 38.213.
* **Observation 3**: Case #7 timing for IAB-MT transmission timing is also fundamentally based on the existing UE timing advance mechanism as specified in clause 4.2, TS 38.213, except an additional configurable offset ($N\_{TA,offset,2}$).
* **Observation 4**: Timing advance step size accuracy requirements aready exist in clause 12.2.3, TS 38.174.
* **Proposal #1**: The existing timing advance step size accuracy requirements in clause 12.2.3, TS 38.174, are applicable for Case #1 and Case # 7 timings.
* **Proposal #2**: No new RRM requirements are needed for Case #1 and Case # 7 timing procedures.

**Case 6 timing:*** **Observation 5**: According to Case # 6 timing procedure, the transmission timing of the IAB-MT is set to the transmission timing of the IAB-DU in the same IAB-node
* **Observation 6**: Any relative timing error between the transmission timings of IAB-MT and IAB-DU in the same IAB node depends on IAB internal architecture and depends on RF impairements inside the IAB. These issues are outside the scope of RRM.
* **Proposal #3**: No RRM requirements are needed for Case # 6 timing procedure.

**CLI for IAB:*** **Observation 7**: According to RAN1 approved IAB CR, there is no new IAB specific CLI procedure for IAB is based on existing Rel-16 CLI solutions for UE.
* **Observation 8**: It is expected that RAN2/RAN3 signaling for CLI for IAB will be based on the existing Rel-16 CLI solutions for UE.
* **Observation 9**: Unlike, the UE, which moves around, the IAB is fixed node. Therefore, the need for CLI requirements (if CLI is needed) will depend on the actual deployment scenario.
* **Observation 10**: RAN4 concluded in Rel-16 not to define RRM measurement requirements for IAB-MT to prevent any implementation limitation.
* **Proposal #4**: For CLI measurements by IAB-MT, no RRM requirements need to be specified.
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| **[R4-2203353](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2203353.zip)****(late contribution)** | Qualcomm | **RAN1 agreement (**RAN1 #103-e**) regarding CLI*** **Use the Rel-16 interference management frameworks (e.g. CLI, RIM) to handle IAB interference scenarios,**

**Proposal 1: RAN4 needs to define CLI measurement requirements and Rel 16 UE CLI measurement requirement can be used as baseline.****Clarification: RAN4 does not need to define any new RRM requirement for Rel-17 eIAB CLI measurement but the already defined CLI measurement requirement for Rel-16 UE should be adopted.**  |

## 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 1-1

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

**Issue 1-1: Case 1 timing**

* Proposals
	+ Option 1: Clarify that current transmit timing requirements apply to case#1 timing mode. (Huawei, Nokia)
	+ Option 2: (Ericsson)
		- The existing timing advance step size accuracy requirements in clause 12.2.3, TS 38.174, are applicable for Case #1 timings.
		- No new RRM requirements are needed for Case #1 timing procedures.
* Recommended WF
	+ Discussions are needed. Options are not mutually exclusive.

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| **Company** | **Comments** |
| Nokia | The main difference between Option 1 and Option 2 is that in Option 1 it is proposed to clarify that existing requirements in clause 12.2.3, TS 38.174 apply to Case #1. In our opinion, exiting requirement are not applicable to Case#6 timing. Regarding Case#7 timing, we discuss more in the Issue 1-3.We also agree the “No new RRM requirements are needed for Case #1 timing procedures.”.Therefore, we think that the agreement on Case#1 timing can be a combination of Option 1 and the second bullet from Option 2, as follows:* No new RRM requirements are needed for Case #1 timing procedures.
* Clarify in the TS 38.174 that current transmit timing requirements apply to case#1 timing mode.
 |
| Ericsson | We are fine with Nokia suggestion above i.e.* No new RRM requirements are needed for Case #1 timing procedures.

Clarify in the TS 38.174 that current transmit timing requirements apply to case#1 timing mode. |
| Huawei | Fine with Nokia’s version above. |
| ZTE | Can go with the revision proposed by Nokia. |

**Issue 1-2: Case 6 timing**

* Proposals
	+ Option 1: Clarify that no other RRM impact of case#6 timing. (Huawei, Nokia, E///)
* Recommended WF
	+ Discussions are needed.

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| **Company** | **Comments** |
| Samsung | Ok to option1. But still would like to clarify the understanding on timing sync of child IAB-MT in case6 timing and parent node DL as whether the legacy cell phase sync requirement covers/applies this case or not? Or for IAB node operating in case 6 timing whether 3us can be assumed as maximum misalignment between this Child IAB-MT and its parent node DL timing?  |
| Nokia | In general, we support Option 1 in the part that “no other RRM impact of case#6 timing”.If by “Clarify” a need to clarify no impact of Case#6 timing in TS 38.174 is meant, then we do not think that such a clarification is needed in the TS. In our view, it is sufficient to clarify that current requirements are applicable to Case#1 timing (Issue 1-1).In reply to the comment by Samsung, we would like to highlight two aspect:1. IAB-DU synchronization mechanisms (i.e., in between child IAB-DU and parent IAB node) were already enabled in Rel-16, i.e., OTA (i.e., using Tdelta) and other alternative ways (e.g., based on GPS). However, no new requirement in addition to cell phase sync requirement were defined.
2. There is already an agreement in IAB Rel-17 RF track:“It is agreed in RAN4 that RF requirements for Timing error between own MT TX and DU TX should be defined for Case#6 timing.” This discussion should be followed but our opinion is that no other requirement on MT TX and DU TX should be introduced in RRM.

Therefore, in our view, the combination of (1) and (2) is sufficient and no separate requirement on misalignment in between child IAB-MT and parent node DL is needed. |
| Ericsson | Support Option 1. The intention is to capture this agreement in the WF i.e. No RRM impact of case#6 timing or No RRM requirement is needed for case#6 timing.  |
| Huawei | Support option 1.  |
| ZTE | Option 1. |

**Issue 1-3: Case 7 timing**

* Proposals
	+ Option 1: (Ericsson)
		- The existing timing advance step size accuracy requirements in clause 12.2.3, TS 38.174, are applicable for Case # 7 timings. (Ericsson)
		- No new RRM requirements are needed for Case # 7 timing procedures. (Ericsson)
* Recommended WF
	+ Discussions are needed.

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| **Company** | **Comments** |
| Nokia | We agree with Option 1.The only difference in between Case#1 and Case#7 timing is the additional offset in Case #7. This however just changes the Rx/TX switching gap at the parent node where the gap is anyway up to implementation to determine. The from the RRM requirement PoV the modes are the same. |
| Ericsson | We support Option 1. We also agree with Nokia that the main difference between case 1 and case 7 is that the latter has an additional configurable/signalled offset ($N\_{TA,offset,2}$). But this additional offset does not need any RRM requirements. |
| Huawei | Support option 1. Share the same understanding as Nokia and Ericsson, compared with case 1, no other performance validation is needed. |
| ZTE | Option 1. No new requirements are needed. |

**Issue 1-4: CLI measurement**

* Proposals
	+ Option 1: For CLI measurements by IAB-MT, no new RRM requirements need to be specified in R17. (Huawei, ZTE, Nokia, Ericsson)
* Recommended WF: Can Option 1 be agreed?

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| **Company** | **Comments** |
| QC | We agree that no NEW RRM requirement, beyond what has already been defined for Rel 16 UE, is needed. However, all Rel 16 UE CLI measurement performance requirement shall be adopted for Rel 17 eIAB.RRM.  |
| Nokia | We support Option 1.However, we think that the proposal by QC also makes sense.Considering that CLI requirements were under standardization in Rel-16, i.e., in parallel to the standardization of IAB, and taking into account RAN1 agreement that “Rel-16 interference management frameworks (e.g., CLI, RIM) is used to handle IAB interference scenarios in Rel-17.”, we think that Section 9.7, TS 38.133 can be referenced in Rel-17 TS 38.174, as follows:The UE requirements in sub-clause 9.7 [6] apply for IAB-MT. |
| Ericsson | We support Option 1. By this we mean new RRM requirements for CLI measurements. IAB-MT is fixed node. But the IAB-MT deployment scenario is different than the UE scenario, which involves mobility. Therefore, the existing UE requirements for CLI in Section 9.7, TS 38.133, cannot be used for IAB-MT. Furthermore, for wide area IAB there was already an agreement in R16 not to define any RRM requirements related to IAB-MT measurements. This is because WA IAB deployment is fully planned and optimized for certain deployment. Any type of measurement needed by WA IAB-MT depends on the network planning/deployment and cannot be determined by standardizing the requirements. |
| Huawei | We support option 1. The CLI measurement defined in 38.133 is for UE with mobility. The agreement in RAN1 shown by companies is at very early state with different options for solutions. And observed from the whole RAN1 work in Rel-17, only CLI information coordination are considered instead of CLI measurement. Thus, we fails to see the reason that IAB-MT has to use CLI measurement and to have requirements for IAB.  |
| ZTE | Option 1. Even in R17 38.174 we don’t think adding CLI related requirement is necessary. |

### CRs/TPs comments collection

*Moderator: The two contributions are addressing to a same issue. See if the CR/TP can be merged.*

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| **CR/TP number** | **Comments collection** |
| **[R4-2201207](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201207.zip)** | **Nokia:**In general, the proposed CR draft is in line with our proposal in the TP below. However, the coverage of proposed changes is a bit wider in our TP.We also think that the scope of the CR on IAB timing might change depending on the agreements in Issues 1-2 and 1-3.If needed, we will be interested in preparation of a merged draft CR on Timing requirements for IAB. |
| E///: Changes in CR and TP can be merged depending on the outcome of issue 1-1. |
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| **[R4-2201850](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201850.zip)** | E///: It should be draft CR not TP. In any case contents in both CR and TP can be merged depending on the outcome of issue 1-1. |
| Huawei: Proposed changes in the TP and that in our CR are similar. For transmit timing, we think clarification at beginning is enough. We agree that same clarification are also needed in TA part. We are fine to capture the outcome or have separate CRs to for transmit timing and TA. No strong views. |
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## Summary for 1st round

### Open issues

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

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|  | **Status summary**  |
| **Issue 1-1** | *Tentative agreements:* * No new RRM requirements are needed for Case #1 timing procedures.
* Clarify in the TS 38.174 that current transmit timing requirements apply to case#1 timing mode.

*Recommendations for 2nd round: No need to further discuss.* |
| **Issue 1-2** | *Tentative agreements:* There is no RRM impact of case#6 timing.*Recommendations for 2nd round: No need to further discuss.* |
| **Issue 1-3** | *Tentative agreements:* * + - The existing timing advance step size accuracy requirements in clause 12.2.3, TS 38.174, are applicable for Case # 7 timings.
		- No new RRM requirements are needed for Case # 7 timing procedures.

*Recommendations for 2nd round: No need to further discuss.* |
| **Issue 1-4** | *Options:** + Option 1: For CLI measurements by IAB-MT, no new RRM requirements need to be specified in R17. (Huawei, ZTE, Nokia, Ericsson)
	+ Option 2: all Rel 16 UE CLI measurement performance requirement shall be adopted for Rel 17 eIAB RRM. (Qualcomm, Nokia)

*Recommendations for 2nd round: Continue the discussion.* |

## Discussion on 2nd round (if applicable)

### Open issues

**Issue 1-4: CLI measurement**

* + Option 1: For CLI measurements by IAB-MT, no new RRM requirements need to be specified in R17. (Huawei, ZTE, Nokia, Ericsson)
	+ Option 2: all Rel 16 UE CLI measurement performance requirement shall be adopted for Rel 17 eIAB RRM. (Qualcomm, ~~Nokia~~)

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| **Company** | **Comments** |
| ZTE | Still support Option 1. Although IAB-MTs adopt some of the UE requirements, it is to be noted that IAB-MTs are deployed in a very different way than UEs, e.g., no mobility, carefully planned by operators, etc. Thus, some of the features supported by UEs are not necessary for IAB-MTs. |
| QC | Still supports Option 2. We can support option 1 is RAN1 also agrees that the planned deployment can address all CLI management need for IAB-MT.  |
| Huawei | We support option 1. The reason are as follows. First, what RAN1 discussed in REl-17 eIAB for CLI is mainly about CLI coordination that IAB node can exchange necessary information to avoid CLI. But it seems that in RAN4 companies interpret CLI equal to CLI measurement. Secondly, the RRM requirements for IAB is only defined for basic procedures which is the basic understanding. For instance, timing requirements and Re-establishment. For CLI measurement, it is even optional for UE with mobility. We don’t see the necessity to have CLI RRM requirements for IAB only because RAN1 has discussed CLI which is not for CLI measurement particularly from our understanding.  |
| E/// | We support option 1. IAB-MT is fixed node and from deployment perspective it is similar to BS. Simultaneous RX/TX exists but there are no BS RRM measurements like CLI. The reason is that BS needs to be optimized according to the deployment scenario. Standardized requirements like CLI will limit the IAB implementation.  |
| Nokia | In our view, Option 1 is clear enough and can be agreed.Regarding Option 2, considering static IAB deployments in Rel-17, we think after all that CLI measurements may not need specific requirements. We expect that there will be anyway some kind of network planning for the IAB deployments which should prevent at least major interference scenarios. Therefore, we prefer not to support Option 2. |

# Recommendations for Tdocs

## 1st round

**New tdocs**

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| **Title** | **Source** | **Comments** |
| WF on IAB enhancement RRM | ZTE Corporation |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| **[R4-2201206](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201206.zip)** | Discussion on RRM requirements for eIAB | Huawei, Hisilicon | Noted |  |
| **[R4-2201207](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201207.zip)** | Draft CR on timing requirements for Rel-17 IAB | Huawei, Hisilicon | Revised |  |
| **[R4-2201405](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201405.zip)** | On RRM for eIAB | ZTE Corporation | Noted |  |
| **[R4-2201849](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201849.zip)** | On IAB Enhanced RRM Requirements | Nokia, Nokia Shanghai Bell | Noted |  |
| **[R4-2201850](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201850.zip)** | TP to TS 38.174 on RRM Timing Requirements | Nokia, Nokia Shanghai Bell | Merged |  |
| **[R4-2202019](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2202019.zip)** | Further analysis of RRM requirements for enhanced IAB | Ericsson | Noted |  |
| **[R4-2203353](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2203353.zip)** |  | Qualcomm | Noted or not treated? | This is a late contribution.QC comment: “I want to mention that we reserved the document number before the submission deadline. However, we ran into some difficulty uploading Tdoc thus had to ask for Carolyn’s help for uploading the next day. This said, we agree with your decision either treating this contribution or not for this meeting.” |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-2202664 | WF on IAB enhancement RRM | ZTE Corporation | Approved |  |
| R4-2202665 | Draft CR on timing requirements for Rel-17 IAB | Huawei, Hisilicon, Nokia | Endorsed |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
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Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)