**3GPP TSG-RAN WG4 Meeting #** **99-e R4-2108158**

**Electronic Meeting, May. 19-27, 2021**

**Agenda item:** 9.16.3

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [99-e][234] NR\_IAB\_enh\_RRM

**Document for:** Information

# Introduction

TDocs submitted to the following agenda items will be treated:

- 9.16.3 RRM core requirements

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

* 1st round: Companies discuss open issues.
* 2nd round: Finalize on the open issues.

# Topic #1: General Discussions

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109001 | ZTE Corporation | **Observation 1:** Inter-band DC is supported in RAN1 as a baseline.**Observation 2:** For intra-band NR-DC, at least synchronous intra-band is supported by RAN1.**Proposal 1: RAN4 shall align with current RAN1 agreement to specify requirements for inter-band NR-DC and synchronous intra-band NR-DC.**Proposal 2: The core requirements of R16 UEs should be used as baseline. |
| R4-2110174 | Intel Corporation | **Observation 1:** RAN4 is to specify corresponding timing requirements for IAB nodes, subjecting to RAN1/2 design regarding simultaneous operation enhancements.**Observation 2:** No RRM impact is seen from topology redundancy.**Observation 3:** RAN4 needs to define CLI measurement requirements subjecting to RAN1/2 design on mechanisms for assisting simultaneous operations. |
| R4-2110347 | Huawei, HiSilicon | **Observation 1:** Regarding the RRM impact of resource multiplexing enhancement, whether there is RRM impact is not clear and RAN4 should wait for RAN1 and RAN2 progress before proceeding.**Observation 2:** There may be RRM impact on timing requirements to enable the simultaneous operation for Rel-17 IAB, and RAN4 should wait for RAN1 and RAN2 progress before proceeding**Observation 3:** The framework of interference management is still under discussion in RAN1.**Proposal 1: RAN4 to further investigate the RRM impact of simultaneous operation and interference management with more RAN1 inputs.** |
| R4-2111110 | Nokia, Nokia Shanghai Bell | 1. The assumption of stationary IAB deployment from Rel. 16 is valid also in Rel.17. Thus, IAB migration-related requirements should be already covered in IAB Rel. 16 specification.

**Proposal 1: No further requirement enhancements for IAB “mobility” (i.e. CONNECTED state mobility, Signalling Characteristics for IAB MTs RLP and Link Recovery procedure) are needed in IAB Rel. 17.**1. It is not expected that application of new multiplexing methods will require introduction of new IAB RRM requirements.
2. No further requirements are expected for Case#1 and Case#7 timing but Case#6 (aligned IAB-MT and IAB-DU TX timing) timing is FFS in RAN1 and RAN4 study is expected for any further requirements.
3. Considering current scope of RAN1 work on Rel.17 enhancements, no impact on RRM requirements in Rel. 17 is expected.
4. No impact on RRM core requirements is expected from RAN1 enhancements in IAB power control operations.
5. As a summary, many of the IAB Rel. 17 issues are still open in RAN1 and the evaluation of their potential impact on RRM core requirements needs to be re-considered later.
6. RRM requirements already specified in Rel. 16 related to the usage of mobility procedures (used for IAB migration) or multi-connectivity under discussion in RAN2 and RAN3 are not expected to be affected with the current understanding of Rel.17 enhancements.

|  |  |  |  |
| --- | --- | --- | --- |
| **RRM Req. Category** | **Sub-Category** | **Specified in Rel. 16 IAB** | **Expected impacted in Rel. 17 IAB** |
| Idle/inactive state mobility | Cell selection/re-selection, measurement | No | No |
| Connected state mobility | Handover | No | No |
| Connection Mobility Control - RRC re-establishment | **Yes** | No |
| Connection Mobility Control - Random Access | **No** | No |
| Connection Mobility Control - RRC Release with Redirection | **Yes** | No |
| Timing | Autonomous timing adjustment | No | No |
| TX timing, timer, TA, Cell Phase Sync accuracy, MRTD/MTTD, derive SSB-IndexFromCell tolerance | **Yes** | **FFS** |
| Signalling | RLM | **Yes** | No |
| Interruption | No | No |
| SCell Activation and Deactivation Delay | No | No |
| UE UL carrier RRC reconfiguration delay | No | No |
| Link Recovery | **Yes** | No |
| Active BWP switch delay | No | No |
| Active TCI state switching delay | No | No |
| PSCell Change | No | No |
| Uplink spatial relation switch delay | No | No |
| UE-specific CBW change | No | No |
| Pathloss reference signal switching delay | No | No |
| Measurement Procedure | General measurement requirement | No | No |
| NR intra-frequency measurements | No | No |
| NR inter-frequency measurements | No | No |
| Inter-RAT measurement | No | No |
| L1-RSRP/L1-SINR Measurement | No | No |
| CSI-RS based L3 measurements | No | No |
| NR measurements with autonomous gaps | No | No |

**Proposal 2: RAN4 to consider using the Table presented above to keep track of potential RRM core requirements impacts introduced by NR-IAB Rel.17.** |
| R4-2111186 | Ericsson | **Observation#1:** Parent IAB-DU does not need to be aware about the TAE between its DL timing and the DL timing of child IAB-DU for case#6 timing operation.**Observation-2:** For the case of child IAB-MT synchronizing with co-located child IAB-DU, Parent IAB-DU needs to be aware about the TAE between its DL timing and the DL timing of child IAB-DU for case#6 timing operation. so the correct setting of the receiving timing on parent IAB-DU will be possible**Observation-3: IAB-TM transmission time error for the first transmission after cas6 timing would be different with legacy for option (b).****Proposal:** **RAN4 investigate if new transmission error requirement would be needed for case 6 timing enabling.**  |

## 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 Scope and Work Plan

*Sub-topic description:*

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

**Issue 1-1: scope of requirements**

* Proposals
	+ Option 1: RAN4 shall align with current RAN1 agreement to specify requirements for inter-band NR-DC and synchronous intra-band NR-DC. (ZTE)
		- Option 1a: The core requirements of R16 UEs should be used as baseline. (ZTE)
* Recommended WF
	+ Can we go with Option 1 / 1a?

**Issue 1-2: RRM impact**

* Proposals
	+ Option 1: RAN4 to further investigate the RRM impact of simultaneous operation and interference management with more RAN1 inputs. (Huawei)
	+ Option 2: No further requirement enhancements for IAB “mobility” (i.e. CONNECTED state mobility, Signalling Characteristics for IAB MTs RLP and Link Recovery procedure) are needed in IAB Rel. 17. (Nokia)
		- Option 2a: RAN4 to consider using the Table presented above to keep track of potential RRM core requirements impacts introduced by NR-IAB Rel.17. (Nokia) (Moderator: the table is given below)

|  |  |  |  |
| --- | --- | --- | --- |
| **RRM Req. Category** | **Sub-Category** | **Specified in Rel. 16 IAB** | **Expected impacted in Rel. 17 IAB** |
| Idle/inactive state mobility | Cell selection/re-selection, measurement | No | No |
| Connected state mobility | Handover | No | No |
| Connection Mobility Control - RRC re-establishment | **Yes** | No |
| Connection Mobility Control - Random Access | **No** | No |
| Connection Mobility Control - RRC Release with Redirection | **Yes** | No |
| Timing | Autonomous timing adjustment | No | No |
| TX timing, timer, TA, Cell Phase Sync accuracy, MRTD/MTTD, derive SSB-IndexFromCell tolerance | **Yes** | **FFS** |
| Signalling | RLM | **Yes** | No |
| Interruption | No | No |
| SCell Activation and Deactivation Delay | No | No |
| UE UL carrier RRC reconfiguration delay | No | No |
| Link Recovery | **Yes** | No |
| Active BWP switch delay | No | No |
| Active TCI state switching delay | No | No |
| PSCell Change | No | No |
| Uplink spatial relation switch delay | No | No |
| UE-specific CBW change | No | No |
| Pathloss reference signal switching delay | No | No |
| Measurement Procedure | General measurement requirement | No | No |
| NR intra-frequency measurements | No | No |
| NR inter-frequency measurements | No | No |
| Inter-RAT measurement | No | No |
| L1-RSRP/L1-SINR Measurement | No | No |
| CSI-RS based L3 measurements | No | No |
| NR measurements with autonomous gaps | No | No |

* Recommended WF
	+ Discussions are needed

**Issue 1-3: Case 6 / 7 Timing**

* Proposals
	+ Option 1: **RAN4 investigate if new transmission error requirement would be needed for case 6 timing enabling.**. (Ericsson)
* Recommended WF
	+ Discussions needed

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Issue 1-1: Issue 1-2: Issue 1-3:  |
| ZTE | Issue 1-1: Fine with the options.Issue 1-2: Generally we’re fine to further study the impact on RRM considering this is only the first meeting to discuss eIAB. If specific questions emerge we can ask RAN1 through a LS.Issue 1-3: We can further study or we can try to engage some detailed technical discussions during this meeting. |
| Qualcomm | Issue 1-1: Agree with option 1/1aIssue 1-2: Agree with option 1Issue 1-3: Section 7.4 of TR38.874 listed a couple of options for case 6 timing. In addition, it also provided a method to reduce TAE. We should take these into account when evaluating whether there is any need for new transmission timing error requirement.  |
| Intel | Issue 1-1: Please proponent clarify what are the RRM requirements to be specified?Issue 1-2: Agree with option 1. Potential CLI related measurement requirements are to be considered.Issue 1-3: Wait for RAN1 conclusion.  |
| Huawei | Issue 1-1: Similar views as Intel, not sure what will be the RRM impact of supporting this DC operation.We have concerns on option 1a. There are a lot enhanced RRM requirements for Rel-16 UE (e.g. multi-CC operations, power saving), however these are not relevant to the enhancement in the Rel-17 eIAB WI. It is more reasonable to take the R16 IAB as baseline.Issue 1-2:Agree with option 1 with more RAN1 inputs.We also agree with option 2, which is also the basic assumption in RAN1/2 discussion. Issue 1-3:Wait for more RAN1 inputs. |
| Nokia, Nokia Shanghai Bell | **Issue 1-1: scope of requirements**In our opinion, it is too early to make a conclusion about a need to specify requirements for inter-band NR-DC and synchronous intra-band NR-DC in RAN4. The discussion of DC scenarios is still ongoing in RAN1. In general, Rel.17 enhancements are mainly related to resource management in DC, and no RRM impacts are expected.**Issue 1-2: RRM impact**Regarding CLI, we need to take into account that CLI was already treated in Rel. 16, e.g., in TR 38.828, and it is not an entirely new issue for Rel. 17.Due to the early stage of the WI, this topic can be followed further in other WGs.However, we do not think that there is a need to choose between Option 1 and Option 2. They are not contradictory. Thus, both Options 1 and 2 are OK for us.**Issue 1-3: Case 6 / 7 Timing**Agree with Option 1. It is also in line with our own observations that Case#6 (aligned IAB-MT and IAB-DU TX timing) timing is FFS in RAN1, and RAN4 study is expected for any further requirements. |
| E/// | **Issue 1-1: scope of requirements:**We do not agree with any of the options 1/1a. It is premature to make any such agreement. For IAB the CA/DC concept is based on BS multicarrier setup NOT based on UE CA/DC concept. For BS multicarrier setup there is no RRM requirements. We need to follow agreements in the RF group. The same issue was discussed in Rel-16 and the conclusion was no RRM requirements for CA/DC are needed. This issue can better be formulated as follows: * Baseline assumption for RRM requirements for CA/DC is the same as in Rel-16. Any RRM requirements for DC/DC in Rel-17 may depend on agreements in the RF group.

 **Issue 1-2: RRM impact**Agree with option 1: It not only depends on RAN1 concept but also an RF issue. Therefore, RRM group should also wait for agreements/conclusions from RF group regarding simultaneous operation and interference management. We do not agree with option 2a that RAN4 should revisit any Rel-16 timing related requirements. This is not within the scope of Rel-17 WI. Note that in option 2a, the table is incorrect regarding timing related requirements in 38.174. The following (shaded in yellow) is specified in Rel-16 for IAB-MT in TS 38.174:

|  |  |  |
| --- | --- | --- |
| Timing | Autonomous timing adjustment | No |
| TX timing, ~~timer,~~ TA, Cell Phase Sync accuracy, ~~MRTD/MTTD, derive SSB-IndexFromCell tolerance~~ | **Yes** |

**Issue 1-3: Case 6 / 7 Timing:** We are fine to wait for RAN1 agreements but also on RF group. Then based on RAN1 agreements and also RF agreements, RRM group can further discuss the need for new requirements for case 6 timing. |

### CRs/TPs comments collection

*Moderator: There is no CR / TP submitted.*

## 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** | *Options:**Option 1:* RAN4 shall align with current RAN1 agreement to specify requirements for inter-band NR-DC and synchronous intra-band NR-DC. The core requirements of R16 UEs should be used as baseline.*Option 2:* Baseline assumption for RRM requirements for CA/DC is the same as in Rel-16. Any RRM requirements for DC/DC in Rel-17 may depend on agreements in the RF group.*Recommendations for 2nd round: Continue discussions.* |
| **Issue 1-2** | *Tentative agreements:* RAN4 to further investigate the RRM impact of simultaneous operation and interference management with more RAN1 inputs.*Recommendations for 2nd round: All companies can support the above option. No need to further discuss.* |
| **Issue 1-3** | *Options: RAN4 investigate if new transmission error requirement would be needed for case 6 timing enabling based on* RAN1 agreements and also based on agreements in the RF session.*Recommendations for 2nd round: No need to further discuss.* |

## Discussion on 2nd round (if applicable)

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Issue 1-1: Can support Option 2, which is “Baseline assumption for RRM requirements for CA/DC is the same as in Rel-16. Any RRM requirements for DC/DC in Rel-17 may depend on agreements in the RF group.” |
| Huawei | Issue 1-1: OK with option 2. |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on eIAB RRM | ZTE Corporation |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-2109001 | On eIAB RRM | ZTE Corporation | noted |  |
| R4-2110174 | RRM requirements for IAB enhancement in Rel-17 | Intel Corporation | noted |  |
| R4-2110347 | Discussion on RRM impact of R17 IAB | Huawei, HiSilicon | noted |  |
| R4-2111110 | General Considerations on Rel. 17 IAB RRM Core Requirements | Nokia, Nokia Shanghai Bell | noted |  |
| R4-2111186 | (R17 IAB) IAB timing for simultaneous TX\_RX\_RRM | Ericsson | noted |  |

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** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
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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