**3GPP TSG-RAN WG2 Meeting #109-eR2-2002283**

**Online, February 24th– March 6th 2020**

Agenda Item: 6.1.1

Source: Ericsson

Title: RRC CRs 38331 36331

Document for: Discussion, Decision

# 1 Introduction

This document contains email discussion:

* [AT109e][015][IAB] RRC CRs 38331 36331 (Ericsson)

**Scope**: Progress RRC CRs.

      Part 2:

**Intended outcome:** Address Open issues, take this meeting’s agreements into account, as they become available. Produce final agreed CR.

**Deadlines**: Mar 4, 5, 6 (see the schedule).

# 2 Discussion

The purpose of this email discussion is to build consensus among companies on the remaining open issues related to the running CRs 38.331, 36.331 for IAB WI. Depending on the outcome of the discussion, a summary reflecting the consensus view will be drafted for the next stage of the discussion.

## 2.1 Open Issues for Running CR 38.331 for IAB WI

The rapporteur has identified several open issues in running CR 38331 that are presented one by one in the remaining part of this subsection. However, companies are welcome to bring relevant open issues not covered by the rapporteur.

**Open issue 1: Whether IAB-MT supports INACTIVE mode and if so, whether the IAB-MT BAP entity be released/suspended on transition to INACTIVE mode.**

So far, RAN2 has not discussed whether IAB-MT will support INACTIVE mode, however, there is a general understanding in RAN2 that unlike UE once an IAB node is up and running the IAB-MT will stay only in CONNECTED mode. Similarly, SA2 also seems to have the same understanding as in the latest 23.501-g03 it is mentioned that after the IAB-MT has completed the registration to the 5G system it remains in CM-CONNECTED state.

**Question A.1: Do companies agree that IAB-MT will not support INACTIVE mode for Rel-16? Please provide motivation if the answer is NO, and input on whether the BAP entity should be released/suspended on transition to INACTIVE mode.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes | We don’t support INACTIVE mode for Rel-16. |
| **CATT** | No | Not sure what prevents us from agreeing on this.  As indicated in R2-2000895, it is more like a topic to clarify instead of agreeing on. IAB MT, as a common understanding, holds the full Uu stack capability.  For the state transition, it is actually quite simple to just follow existing spec. In short, we just need to  - confirm that IAB-MT releases BAP entity (and perhaps also the release of DU based on implementation) before transition to inactive and idle, and  - After release it just follows UE’s procedure according to current spec (no changes needed).  We failed to see any extra complexity (in both implementation and specification) in the above procedure. On the contrary, to specify that IAB-MT does not support other modes than connected actually requires some effort? |
| Huawei | Yes, not support |  |
| KDDI |  | The description “not support INACTIVE mode” seems little bit unclear. We should discuss option1 or option2.   * Option1: Assuming that the donor-CU will not indicate suspend to the IAB-MT, and it’s up to IAB-MT’s implementation with regard to its behavior when it receives suspend from the donor. * Option2: The IAB-MT’s behavior is clearly specified in TS38.331 so that the IAB-MT is required to discard the RRCrelease including suspendConfig. |
| Lenovo&MM | Yes | The motivation of inactive state in Rel-15 is to reduce the signaling overhead for the case that UE has a non-frequent data. IAB node does not have such data service. Therefore, it is unnecessary to support the inactive state. |
| Nokia | Yes | We do not see any need for IAB-MT to support RRC INACTIVE mode. |
| vivo | Yes | According to the agreement reached at #107bis:  *From R2 specifications point of view, IAB MT (or other term if changed) is equivalent to UE, unless otherwise stated*  It is possible that IAB-MT will support inactive state if we are able to figure out the signaling procedures (e.g., BAP and routing configurations) in terms of the state transition from INNACTIVE to ACTIVE in R16.  So, we think INACTIVE state should not be supported in this release. |
| ZTE | Yes | It is not necessary to support inactive mode for IAB node since IAB node has to support not only UEs but also child IAB nodes. It is rare case that no traffic is delivered to or from IAB node. |
| Futurewei | Yes | We agree that an IAB-MT should not support INACTIVE state.  We prefer Option 2 proposed by KDDI above. That way this issue is crystal clear, and there is no need to further discuss issues such as how to handle INACTIVE state, whether to release BAP, DU, etc. |
| Samsung | Yes |  |

**Summary:** There is a clear consensus that the IAB-MT will not support the INACTIVE mode except one company that supports INACTIVE mode for IAB-MT. The rapporteur would like to highlight that some companies that argued (in this discussion) not to support INACTIVE mode also suggested not to discuss Rel-15 UE features at all in their comments for another email discussion (offline-024). In fact, these companies refused to make this mandatory feature to be optional. Since INACTIVE mode is also part of the Rel-15 UE features, the rapporteur will respect companies’ views and will not propose anything due to the contradicting positions on the same matter. It is suggested to continue the discussion on Rel-15 UE features in the next RAN2 meeting.

**Open issue 2: Whether the BAP entity at the IAB-MT be released on transition to IDLE mode.**

There is a common understanding that unlike UE the IAB-MT will not transition to IDLE mode on purpose but when lost connectivity with the network. Hence, the BAP entity and F1 interface instance should be removed, which is also proposed in [1-2]. However, the rapporteur would like to ask other companies about their viewpoint on this issue.

**Question A.2: Do companies agree that BAP entity at IAB-MT be released on transition to IDLE mode for Rel-16? If not, please provide motivation for your answer.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes |  |
| **CATT** | Yes | See comments above. |
| **Huawei** | **Yes, to release** | The motivation to release BAP is same as for PDCP/RLC so that the old invalid data (due to security change) will not be sent the new connected CU. |
| **KDDI** | **Yes** |  |
| **Lenovo&MM** | **Yes** | When re-establishment fails, IAB node needs to enter idle state. |
| **Nokia** | **Yes** |  |
| vivo | Yes | Since the BAP need to be reconfigured after IAB-MT enters connected state again, it’s better to release the BAP entity so that routing table can be updated without any further impact. |
| ZTE | Yes |  |
| Futurewei | Yes |  |
| Samsung | Yes |  |

**Summary:** There seems a consensus that the BAP entity at the IAB-MT be released on transition to IDLE mode. So, the rapporteur proposes the following:

**Proposal 1:** The BAP entity at the IAB-MT be released on transition to IDLE mode.

**Open issue 3: Whether at least one DRB must be configured by the network so that the IAB- MT triggers RRC procedures, when applicable, e.g. RRC Re-establishment, etc.**

The RRC spec requires a UE in RRC\_CONNECTED mode to have AS security activated via SRB2 and at least one DRB setup. One company understands that the same requirement also applies to IAB-MT. However, the rapporteur’s understanding is that the reason for that in legacy RRC is that the only reason for establishing a UE’s connection was for UL/DL data transmission (except for the late considerations in signaling only connections), and thus it is reasonable to assume at least one DRB will always be setup in CONNECTED mode. In the IAB case, on the other hand, the only case where a DRB setup may be, optionally, set-up is for the case where the OAM needs to be accessed via a DRB (as agreed by RAN3). Otherwise, all user traffic is transported via BH RLC channels between IAB-MT and parent IAB-DU. The rapporteur would like to ask other companies about their input on this issue.

**Question A.3: Do companies agree that it is not mandatory for the IAB-MT to be configured with at least one DRB? If not, please provide motivation for your answer.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comment** |
| Ericsson | Agree | As we have stated in discussion #024:  - RAN3 has agreed that DRB may be set-up only for OAM and this can be optionally configured.  - RRC specs state that a configuration with DRB is invalid  From 38.331: “A configuration with SRB2 without DRB or with DRB without SRB2 is not supported (i.e., SRB2 and at least one DRB must be configured in the same RRC Reconfiguration message, and it is not allowed to release all the DRBs without releasing the RRC Connection).”   * RAN3 agreement is not supported by the RAN2 specification.   RRC should allow a configuration that only has a SRB2 but no DRBs.  If DRBs are not mandated to be configured (as per RAN3 agreement), RAN2 must fix their RRC specification. Otherwise, an RRC reconfiguration without an DRB will always be invalid (as per RRC specification), or the CU will always have to configure a DRB (which is not aligned to the RAN3 agreements).  RRC should write as:  “For IAB-MTs, a configuration without DRBs is supported”  We would like to have a technical argumentation over this as the most used argumentation is “MT should follow legacy UE behavior” without any additional technical added value. |
| **CATT** | **Agree** | To bundle SRB2 with a DRB is not critical for IAB. we agree with Ericsson that ‘RRC should allow a configuration that only has a SRB2 but no DRBs.’ |
| **Huawei** | **Disagree** | First, we need to wait for the decision in [AT109e][024] on the same issue.  For this case, there is no difference between IAB-MT and UE.  If one thinks establish RRC connection not for DRB, that means we need to define the new RRC connection cause indication. This is because legacy RRC connection established are normally triggered by upper for UL/DL data.  We see no need to support the none DRB case for IAB-MT. |
| **KDDI** | **Agree** | Same vie as Ericsson |
| **Lenovo&MM** | **No strong view** |  |
| **Nokia** | **Disagree** | We prefer to align with legacy behavior and do not specify new procedures and behavior. Even if one does not use the DRB for OAM traffic, the Donor can just establish a single DRB and not use it. |
| vivo | OK, but … | We are not sure whether IAB node would be able to support data traffic (application) in the future. |
| ZTE | Disagree | It is suggested that IAB node is at least configured with one default DRB. |
| Futurewei | Disagree | We agree with Nokia. The donor CU can always setup a DRB, but not use it.  At this late stage, it is better to follow the legacy procedure, unless there is some technical issue with that procedure. Otherwise, we may be forced to inadvertantly introduce even more changes to the standard, just to accomodate this issue. |
| Samsung | Agree |  |

**Summary:** This issue is also discussed and summarized in offline-024. Companies that argued the DRB configuration to be mandatory for the IAB-MT have not provided any technical reason but to follow legacy procedure. The rapporteur will not propose anything here for this issue.

**Open issue 4: How to implement the signaling for the optional LCID-Ext field.**

Since RAN2 has agreed on a 16-bit optional extension of LCID space for IAB node, the remaining issue is how to design RRC signaling that provides an IAB-MT the flexibility to choose among the legacy and extended ID range based on IAB-MT implementation or capability. Few companies argued to use/design just one field with an extended range and in case the node does not support extended LCID space, then the node would only configure legacy ID range (i.e., LCID values up to 32). Some other companies argued that IAB node should be given a choice to select among legacy and extended ID range, and the IAB-MT does not have to handle the extended values. Considering that the extended LCID space is optional, the rapporteur would like to ask the following:

**Question A.4: Companies can provide the preferred way of signaling so that NWs DUs/MTs not implementing the LCID-Ext do not have to support or implement it.**

|  |  |
| --- | --- |
| **Company** | **Preferred way of signaling** |
| Ericsson | **The LCID-ext is optional, and this should be reflected in the ASN.1. An MT or DU not supporting such extension, should not implement or care about the IE providing or carrying extended ID. If a single IE with the whole range is introduced, the MT/DU has to support the IE that includes the extension of the LCIDs, and hence, it does not become optional. It is mandated to implement an element and the code around it.**  **Thus, we are open to different formulations as long as the two elements are separated. This can be done via a choice as it has been suggested by other companies.** |
| **CATT** | As discussed before, we think choice structure can be considered. The argument of optionality is not that critical. We see an ongoing email discussion on having ext. LCID even for Uu and there seems to be no much objection… |
| **Huawei** | **Not to use CHOICE.** BH-LogicalChannelIdentity is indicated just by one extend IE (e.g. BH-LogicalChannelIdentity INTEGER (0.. maxLC-ID-Iab-r16)).  maxLC-ID-Iab-r16=65535  This is not related whether IAB-MT support the extended LCID in MAC. If IAB-MT does not support the extinction in MAC, CU would configure the BH-LogicalChannelIdentity with value range [0,32]. Otherwise, CU could configure any value range [0, maxLC-ID-Iab-r16]. It means only one IE is sufficient. |
| **KDDI** | **We prefer to use CHOICE. Extending IE seems a bit confusing.** |
| **Lenovo&MM** | **Slightly prefer ‘choice’ structure because it can be easier to understand that there are two types of ID.** |
| Nokia | We prefer to use a single parameter with a value range of the extended LCID. It is odd to introduce choice structures for exactly the same parameter, but with different range. What is even more important, having two parameters will require us to always refer to both in the specifications, which complicates it unnecessarily.  We also do not understand the argument of mandating to implement the parameter. How is implementing an INTEGER with smaller size more complicated than implementing INTEGER with higher size? And how is it more complicated than introducing a CHOICE structure? In the CHOICE structure you need to code that always non-extended LCID is indicated while with a single LCID parameter, if you do not want to use extended LCID, then you simply indicate LCIDs with legacy value always. There is no mandate to implement extended LCID either way. |
| vivo | Share the same view with Huawei. The baseline is not to mandate the implementation of extended LCID. Under this premise, the impact is minor. |
| ZTE | We think CHOICE can be used to distinguish whether the extended LCID or legacy LCID is configured. |
| Futurewei | We agree with Nokia, Vivo, and Huawei. Both approaches would likely work, but just referring to a single parameter would seem to be much easier in terms of terms of specification impact. |
| Samsung | Prefer the choice structure. It is easy to understand, at the same time, optionality can be guaranteed. I think using single extended IE is similar one as CU anyhow determine to which range is applicable to that DU based on DU’s support of extension. The only difference is to keep two Ies at the same time. We think keeping two is straightforward. |

**Summary:** There is no clear consensus on how to signal the optional LCID-ext field. However, most of the companies (6 out of 10) prefer the choice structure to distinguish whether the legacy or extended LCID is configured. While the remaining companies (4 out of 10) prefer a single parameter for signaling both the legacy and extended LCID space. As rapporteur, we would suggest continuing with the choice structure and propose the following:

**Proposal 2:** IAB node will select between legacy and extended ID range using the CHOICE in ASN.1 for RRC signaling.

**Open issue 5: Whether other information should be included in the BAP configuration.**

In the tdocs for RAN2#109-e, several companies have proposed the IP address(es) assigned to an IAB node to be included in the BAP configuration. The rapporteur understands other information in BAP configuration could be included depending on the future agreements for IAB Rel-16 WI and the running CR 38.331 can be updated as IAB Rel-16 WI progresses. Also, companies can bring issues related to TS 38.331 not covered in the discussion.

**Question A.5: Do companies agree that the IP address(es) assigned to an IAB node be included in the BAP configuration?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes |  |
| **Huawei** | **Maybe** | Let’s wait for the agreement from IP address email discussion. |
| **KDDI** | **Yes** |  |
| **Nokia** | **No** | IP address configuration has nothing to do with BAP protocol, e.g. BAP specification will not use them or refer to them. This should be an IE outside of BAP configuration in RRCReconfiguration message. |
| **ZTE** | **No** | We think it would be better to configure the IP address outside of BAP configuration. |
| **Futurewei** | **No** | We tend to agree with Nokia and ZTE. What is the relationship of the IP address to the BAP specification? |
| **Samsung** | **No** | We share the same view with Nokia, ZTE. |

**Summary:** Majority companies disagree with the IP address(es) assigned to an IAB node be included in the BAP configuration. In fact, the rapporteur made an error asking IP address(es) instead of “Path List” for UL routing.

**Question A.6: Any other comment?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| **Huawei** | There are one proposal from email discussion R2-2000989, which is supposed to be agreeable. Those should be captured in RRC.  Proposal 4a: During bootstrapping, the default routing ID and BH RLC channel as configured by RRC are used for non-F1 traffic (i.e. no dedicated configuration for non-F1).  This is should be clarified to the field description of defaultUL-BAPRoutingID and  defaultUL-BH-RLC-Channel.  Besides, the size of BH RLC channel ID is still FFS. Our proposal is to use 16 bits. Since we agreed to extend 16 bits LCID plus the 32 values of legacy. And also, MAC has keep at least 128 of the extended values as reserved. So, at most 2^16+32-128 can be used for BH LCID, which means 16 bits is enough.  bh-RLC-ChannelID-r16 ENUMERATED{ffs}  At last, there are still some FFS values for “Multiplicity and type constraint definitions”. We should work on that now. |
| **Nokia** | We need to add a configuration for F1AP over SRB transfer for EN-DC IAB-MT. We propose to do that by adding a configuration parameter in NR RRCReconfiguration message (please see our paper in R2-2001057) |

**Summary:** The rapporteur understands the points raised by Huawei (first comment) and Nokia are valid and will be addressed in the new versions of RRC CRs for 38.331 and 36.331. However, regarding the second comment from Huawei, the rapporteur would like to highlight that RAN3 agreed that the max number of BH RLC channels is 16384, and RAN2 needs to implement this in the relevant CRs.

## 2.2 Open Issues for Running CR 36.331 for IAB WI

The rapporteur has identified one open issue in running CR 36.331 for IAB WI, however, companies are welcome to bring other relevant open issues for 36.331.

**Open issue 1: Whether to use F1-AP or F1-C for message(s) carried in LTE RRC container for the EN-DC case.**

RAN2 has agreed that SRB2 will be used for transport of all F1-AP messages for the EN-DC case. However, one company referred to use F1-C instead of F1-AP, while some other companies argued that F1-C will mislead to the interpretation of IPsec being included in the protocol stack. To resolve this issue, the rapporteur would like to ask companies for their input on this matter.

**Question B.1: Do companies agree to use 1) F1-AP or 2) F1-C terminology for the message(s) carried in LTE RRC container for the EN-DC case? Please provide motivation for your answer.**

|  |  |  |
| --- | --- | --- |
| **Company** | **1)/2)** | **Comment** |
| **Huawei** | **F1-C** | The motivation is to support the transmission of SCTP/IP over LTE. Otherwise, the F1-AP transmission is meaningless without SCTP connection. |
| **Nokia** | **Both** | **We propose to clarify that “the carried information consists of F1AP message encapsulated in SCTP/IP or F1-C related SCTP/IP packet”.** |
| **ZTE** | **F1-C** |  |
| **Futurewei** | **F1-C** | F1-C seems to be more aligned with terminology already agreed by RAN3 for X2 interface. The detail mentioned by Nokia “the carried information consists of F1AP message encapsulated in SCTP/IP or F1-C related SCTP/IP packet” could be captured in a node or field description. |
| **Samsung** |  | We support the rapporteur’s suggestion below. |

**Summary:** It seems that companies agree to F1-C terminology and the details provided by Nokia. So, the rapporteur suggests the following:

**Proposal 2:** For EN-DC case, the SRB2 on LTE leg carries information that consists of an F1-AP message encapsulated in SCTP/IP or F1-C related SCTP/IP packet.

**Question B.2: Any other issue related to running CR 36.331 to be covered/discussed in this email discussion?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
|  |  |
|  |  |

# 3 Summary

The rapporteur suggests the following sets of proposals for approval:

**Easy Agreeable:**

**Proposal 1:** The BAP entity at the IAB-MT be released on transition to IDLE mode.

**Proposal 2:** For the EN-DC case, the SRB2 on LTE leg carries information that consists of an F1-AP message encapsulated in SCTP/IP or F1-C related SCTP/IP packet.

**Need some discussion:**

**Proposal 1:** IAB node will select between legacy and extended ID range using the CHOICE in ASN.1 for RRC signaling.

# 4 Reference

[1] R2-2000661; “Considerations on BAP Entity Release”, KDDI, RAN2#109-e, 2020.

[2] R2-2000895; “Views on RRC States of IAB nodes”, CATT, RAN2#109-e, 2020.