**3GPP TSG-RAN WG3 #119bis-e [R3-231863](Inbox\\R3-231863.zip)**

**17th – 26th April 2023**

**Online**

Agenda Item: 9.2.4

Source: ZTE (moderator)

**Title: Summary of CB: # 6\_R17IAB**

Document for: Approval

# Introduction

This paper is for the following offline discussion:

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| **CB: # 6\_R17IAB**  **- Check reply LS from RAN1 in [R3-231105](Inbox\\R3-231105.zip) and the corresponding corrections proposed in RAN3**  **- SA3 LS related: The source/initial IAB-donor can obtain the new IP address(es) for F1-C from the target/new IAB donor via XnAP, i.e. XnAP HANDOVER REQUEST ACKNOWLEDGE, UE CONTEXT RELEASE messages?**  **- Update the IAB Barred IE’s configuration granularity from per cell to per PLMN/NPN in F1 interface?**  (moderator - ZTE)  Summary of offline disc [R3-231863](Inbox\\R3-231863.zip) |

This discussion has two phases:

**Phase 1:** Converge on potential proposals. Please give your feedback before **Thursday, April 20th at 23.59 UTC**

**Phase 2: TBD**

The following contributions will be discussed in this CB:

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| [R3-231105](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231105.zip) | Reply LS on RB set configuration (RAN1, ZTE) | LS in  R17 |
| [R3-231360](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231360.zip) | Correction to TS 38.423 on RB Set Configuration (ZTE, Lenovo, Qualcomm, Nokia, Nokia Shanghai Bell, CATT) | CR1014r, TS 38.423 v17.4.0, Rel-17, Cat. F |
| [R3-231361](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231361.zip) | Correction to TS 38.473 on RB Set Configuration (ZTE, Lenovo, Qualcomm, Nokia, Nokia Shanghai Bell, CATT) | CR1145r, TS 38.473 v17.4.1, Rel-17, Cat. F |
| [R3-231855](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231855.zip) | (CR TS 38.423) Correction of RB Set Configuration (Ericsson) | CR1047r, TS 38.423 v17.4.0, Rel-17, Cat. F |
| [R3-](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231311.zip)[231311](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231311.zip) | Discussion on SA3 LS related to dynamic PSK for IAB inter-CU topology adaptation (Qualcomm Inc.) | discussion |
| [R3-2](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231495.zip)[314](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231495.zip)[95](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231495.zip) | Discussion on the F1-C IP addresses mapping issue from SA3 LS R3-230872 (Huawei) | discussion |
| [R3-231787](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231787.zip) | Discussion on SA3 LS on Mapping of F1-C IP addresses (ZTE) | discussion |
| [R3-231](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231788.zip)[788](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231788.zip) | [draft] Reply LS on Mapping of F1-C IP addresses (ZTE) | LS out To: SA3 CC: |
| [R3-231](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231481.zip)[481](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231481.zip) | Correction on IAB bar configuration (Huawei, Qualcomm, Xiaomi) | CR1152r, TS 38.473 v17.4.1, Rel-17, Cat. A |
| [R3-231856](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231856.zip) | Correction on IAB bar configuration (Huawei, Qualcomm, Xiaomi) | CR1151r1, TS 38.473 v16.13.0, Rel-16, Cat. F |

# For the Chair’s Notes

Propose the following:

# PHASE 1: Discussion

## Reply LS/CRs on RB set configuration ([R3-231105](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231105.zip)/[R3-231360](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231360.zip)/[R3-231361](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231361.zip)/[R3-231855](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231855.zip))

In reply LS on RB set configuration was received in [1] which is copied in the below:

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| RAN1 thanks RAN3 for the LS R1-2300006(R3-226781) on RB set configuration where the following question was asked:   |  | | --- | | **Question:** RAN3 has uncertainty on how to define the start RB index for the Rel-17 IAB-DU HSNA resource configuration of an IAB-DU cell.  RAN3 has two different understandings:   * Understanding 1: the start RB index for the Rel-17 IAB-DU HSNA resource configuration of the IAB-DU cell is point A plus the SCS-specific offset defined in the *NR Carrier List* IE based on the SCS included in the *RB Set Configuration* IE. * Understanding 2: the start RB index for the Rel-17 IAB-DU HSNA resource configuration of the IAB-DU cell is point A plus the smallest SCS-specific frequency offset across all numerologies provided by the *NR Carrier List* IE for this cell. Note that in this understanding, the start RB index does not depend on the SCS value included in the *RB Set Configuration* IE in TS 38.473.   In both understandings, the start RB is aligned with point A in case the *NR Carrier List* IE is not present.  RAN3 kindly asks RAN1 to provide clarification on which of the two understandings is correct. |   **Answer:** RAN1 has discussed the above question and would like to clarify that the modified understanding 2 as below is correct:   * The start RB index for the Rel-17 IAB-DU HSNA resource configuration of the IAB-DU cell is the RB index of the lowest common RB with the reference SCS, which overlaps with the lowest usable RB across all SCS-specific carriers provided by the NR Carrier List IE for this cell. |

Based on the reply LS from RAN1, the semantics description for the start RB index of the first RB set in the *RB Set Configuration* IE in TS 38.423/38.473 needs to be corrected to reflect the latest RAN1 agreement.

* Contribution [2][3] provide CRs to TS 38.423/38.473 respectively with the following correction:

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| Number of RB Sets | M |  | INTEGER(1.. *maxnoofRBsetsPerCell)* | Number of configured RB sets. The RB sets are contiguous and non-overlapping. If *NR Carrier List* IE(9.2.2.63) is provided, the start RB index of the first RB set is the RB index of the lowest common RB with the SCS provided by *RB Set Configuration* IE, which overlaps with the lowest usable RB across all SCS-specific carriers provided by the *NR Carrier List* IE for the IAB-DU cell. Otherwise, the lowest subcarrier of the start RB of the first RB set is aligned with point A for the IAB-DU cell. |

* Contribution [4] provides the CR to TS 38.423 with the following correction:

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| Number of RB Sets | M |  | INTEGER(1.. *maxnoofRBsetsPerCell)* | Number of configured RB sets. The RB sets are contiguous and non-overlapping. The start RB index of the first RB set is the RB index of the lowest common RB assuming the reference subcarrier spacing, which overlaps with the lowest usable RB for the IAB-DU cell. |

In the moderator’s view, the correction in [2][3] describes the two case where the IAB-DU cell has one or multiple numerologies respectively and is aligned with the answer provided in the reply LS from RAN1 [1]. While the correction in [4] describes the two cases where the IAB-DU cell has one or multiple numerologies in one sentence. However, it’s not clear whether “the lowest usable RB for the IAB-DU cell” means the lowest usable RB across all SCS-specific carriers for the IAB-DU cell or the lowest usable RB for the carrier with the the SCS provided by *RB Set Configuration* IE.

**Q1: Do you prefer option 1 (i.e. the correction in [2][3]) or option 2 (i.e. the correction in [4])? Do you have any other comments or other options?**

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| Company | Option 1/2 | Comments |
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## On SA3 LS related to dynamic PSK for IAB inter-CU topology adaptation (R3-231311/R3-231495/R3-231787/R3-231788)

During RAN3#119 meeting, an LS on Mapping of F1-C IP addresses in the IAB inter-CU topology adaptation and backhaul RLF recovery procedures (R3-230872) was received from SA3. In the LS, SA3 requests RAN3 to provide a suitable method for Source/Initial Donor-IAB node to know the mapping between these F1-C IP addresses in the IAB inter-CU topology adaptation and backhaul RLF recovery procedures in order for SA3 to progress with its security work.

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| 1 Overall description  SA3 is currently trying to specify the security handling of IAB inter-CU topology adaptation and backhaul RLF recovery procedures.  In this work, SA3 would need more information for defining one aspect in a way sympathetic to the current flows in TS 38.401, when using dynamic PSK. SA3 believe that the Source/Initial Donor IAB-node needs to know the mapping between the old IP address of the F1-C interface and the new IP address. This mapping is needed to identify the security credentials that will be used to re-establish (using IKE) the IPsec connection used to protect the FI-C interface. In particular this needs to be done for IPsec transport mode and also when there are one or more old/new IP addresses.  SA3 requests RAN3 to provide a suitable method for Source/Initial Donor-IAB node to know the mapping between these IP addresses in order for SA3 to progress with its security work.  2 Actions  **To RAN3**  **ACTION: SA3 asks RAN3 to provide a suitable method for Source/Initial Donor-IAB node to know the mapping between the old and new IP addresses in order for SA3 to progress with its security work.** |

In [R3-231311 QC], it was observed that the issue raised by SA3 only applies to 1) the use of dynamic PSK-based authentication for F1, whose support is not mandated; 2) when IAB-MT and IAB-DU connect to different CUs, a scenario that was not considered when the dynamic PSK-based authentication was designed. And it was further observed that the solutions to the issue raised by SA3 require NBC changes to St3 and St2, which add signaling and processing overhead, and increase the overall complexity of the procedures. And it was proposed that dynamic PSK-authentication is only supported when IAB-MT and IAB-DU connect to the same donor.

For the [R3-231495 HW][R3-231787 ZTE], enhancements to Xn signaling are suggested to support the dynamic PSK-authentication for IAB inter-CU topology adaptation and backhaul RLF recovery procedures in SA3. In moderator’s view, the first question is whether dynamic PSK-authentication is to be supported for IAB inter-CU topology adaptation/backhaul RLF recovery/redundancy procedures from RAN3 perspective.

**Q2: Do you agree that RAN3 to support dynamic PSK-authentication for IAB inter-CU topology adaptation/backhaul RLF recovery/redundancy procedures?**

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If the question to Q2 is yes, RAN3 needs to discuss how to support dynamic PSK-authentication for IAB inter-CU topology adaptation/backhaul RLF recovery/redundancy procedures.

In [R3-231311 QC] and [R3-231787 ZTE], it observed/proposed that the problem could be solved by providing explicit copy of the IAB-DU’s new IP addresses to the source CU/initial via Xn before the IAB-DU uses these IP addresses for an IKE exchange with the source CU. In [R3-231311 QC], it further observes that an indicator needs to be included as well to indicate that the same IP addresses will be sent to the IAB-node shortly for the inter-donor RLF recovery procedure.

In [R3-231495 HW], it is proposed that for F1-C, the mapping of old IP and new IP should be known by source CU and IAB-node, before any SCTP handshake message on target path. And it is suggested that the mapping of old IP and new IP address, TNL address index and the TNL address usage are informed to the source/initial donor via Xn.

**Q3-1: If the answer to Q2 is yes, do you agree that the IAB-DU’s new IP address(es) for F1-C are informed to the F1-terminating donor from non F1-terminating donor via Xn?**

**Q3-2: Do you think any of old IP address info, IP address usage or additional indicator needs to be informed to the F1-terminating donor as well? What else information besides the IAB-DU’s new IP address(es) needs to be informed to the F1-terminating donor?**

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If RAN3 agree that additional information needs to be informed to F1-terminating donor via Xn to support dynamic PSK-authentication for IAB inter-CU topology adaptation/backhaul RLF recovery/redundancy procedures, it needs to be discussed which message is to be enhanced.

* For inter-donor topology adaptation (partial migration):

In [R3-231311 QC], [R3-231787 ZTE] and [R3-231495 HW], it is suggested that the additional information is explicitly included in the Xn HANDOVER REQUEST ACKNOWLEDGE message.

* For inter-donor BH RLF recovery

In [R3-231311 QC], it is observed that the additional information would have to be included in an additional Xn TMM signaling.

In [R3-231787 ZTE], it is suggested that the additional information is included in the Xn UE CONTEXT RELEASE message.

In [R3-231495 HW], it is suggested that the additional information is included in a newly defined Xn message.

* For inter-donor redundancy

In [R3-231311 QC], it is observed that the additional information is sent to CU1 via the Xn TM Management Response and/or via Xn TM Modification Request.

**Q4-1: If the answer to Q2/Q3-1 are yes, do you agree that Xn HANDOVER REQUEST ACKNOWLEDGE message is enhanced to support dynamic PSK-authentication for inter-donor migration procedure? If no, please provide the reason and your preferred option.**

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**Q4-2: If the answer to Q2/Q3-1 are yes, which option do you prefer to support dynamic PSK-authentication for inter-donor BH RLF recovery procedure?**

**- Option 1: an additional Xn TMM signaling (i.e. IAB TRANSPORT MIGRATION MODIFICATION REQUEST) is sent to transfer additional information**

**- Option 2: the Xn UE CONTEXT RELEASE message is enhanced to transfer additional information**

**- Option 3: a new Xn message is defined to transfer additional information**

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| Company | Option 1/2/3 | Comments |
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**Q4-3: If the answer to Q2/Q3-1 are yes, do you agree that Xn IAB TRANSPORT MIGRATION MANAGEMENT RESPONSE message is enhanced to support dynamic PSK-authentication for inter-donor redundancy procedure? If no, please provide the reason and your preferred option.**

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In [R3-231495 HW], it is proposed that the IP address mapping info is sent to the IAB node and an LS needs to be sent to RAN2 for checking the RRC impact. For descendant IAB node, it is suggested that the source CU generates the old and new IP address mapping for the descendant IAB-node after receiving the new IP address, and sends the mapping to descendant IAB-MT.

**Q4-4: Do you agree that the IP address mapping info needs to be informed to the (descendant) IAB node? If yes, do you agree that RRC needs to be enhanced for this purpose?**

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## Correction on IAB bar configuration (R3-231481/R3-231856)

In [9][10], it is observed that the iab-Support in SIB1 is provided per PLMN/NPN. However, the existing IAB Barred IE in F1 is configured per cell, which is not aligned with the granularity of the iab-support in SIB1. And it is suggested to update the IAB Barred IE’s configuration granularity from per cell to per PLMN/NPN in F1 interface.

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| ***Reason for change:*** | The definition for *iab-support* IE in TS38.331 is: *This field combines both the support of IAB and the cell status for IAB. If the field is present, the cell supports IAB and the cell is also considered as a candidate for cell (re)selection for IAB-nodes; if the field is absent, the cell does not support IAB and/or the cell is barred for IAB-node.* And the iab-Support in SIB1 is provided per PLMN/NPN. In F1AP, CU can configure the IAB barred to the DU. However, the existing *IAB Barred* IE in F1 is configured per cell, not align with the granularity of the iab-support in SIB1. |
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| ***Summary of change:*** | Update the *IAB Barred* IE’s configuration granularity from per cell to per PLMN/NPN in F1 interface.  **Impact analysis**  Impact assessment towards the previous version of the specification (same release):  This CR has isolated impact with the previous version of the specification (same release).  This CR has impact on the configuration of IAB bar from CU to DU.  The impact can be considered isolated because the change affects only the IAB related procedure.  The changes are non backward compatible. |
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| ***Consequences if not approved:*** | If a cell supports multiple PLMN/NPNs, it is not possible to allow CU to provide the per PLMN/NPN level IAB barred configuration, instead, the change of IAB barred status will be applied to the whole cell. |

**Q5: Do you agree with these 2 CRs (R3-231481/R3-231856) and/or have any comments?**

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# PHASE II: Convergence of PH1

**TBD…**

# References

1. R3-231105 Reply LS on RB set configuration (RAN1, ZTE)
2. R3-231360 Correction to TS 38.423 on RB Set Configuration (ZTE, Lenovo, Qualcomm, Nokia, Nokia Shanghai Bell, CATT)
3. R3-231361 Correction to TS 38.473 on RB Set Configuration (ZTE, Lenovo, Qualcomm, Nokia, Nokia Shanghai Bell, CATT)
4. R3-231855 (CR TS 38.423) Correction of RB Set Configuration (Ericsson)
5. R3-231311 Discussion on SA3 LS related to dynamic PSK for IAB inter-CU topology adaptation (Qualcomm Inc.)
6. R3-231495 Discussion on the F1-C IP addresses mapping issue from SA3 LS R3-230872 (Huawei)
7. R3-231787 Discussion on SA3 LS on Mapping of F1-C IP addresses (ZTE)
8. R3-231788 [draft] Reply LS on Mapping of F1-C IP addresses (ZTE)
9. R3-231481 Correction on IAB bar configuration (Huawei, Qualcomm, Xiaomi)
10. R3-231856 Correction on IAB bar configuration (Huawei, Qualcomm, Xiaomi)