3GPP TSG-RAN WG3 #114bis-e R3-221054

Online, 17-26 Jan 2022

Agenda Item: 13.4.1

Source: Nokia (moderator)

Title: Summary of Offline Discussion on CB: # 1307\_IAB\_Res\_Multiplex

Document for: Approval

# Introduction

**CB: # 1307\_IAB\_Res\_Multiplex**

**-Converge on details for Xn signalling**

**- Should new Xn procedures tackle multiple functions, e.g. exchange of QoS info/BAP parameters, resource configuration**

**-Converge on details for F1 signalling**

**-Can it be agreed that no enhancements are needed for time alignment of resource configuration across nodes?**

(Nok - moderator)

Summary of offline disc [R3-221054](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23114bis-e.exe/1.%20IAB/CBs%20IAB.exe/CB%20%23%201307_IAB_Res_Multiplex/Inbox/R3-221054.zip)

The discussion has two phases:

**Phase 1: Identify potentially achievable agreements for online discussion.**

**Phase 2: TBD**

The deadline for Phase 1 is Thursday, Jan 20th, 23:59:59 UTC. This allows the moderator to prepare the proposals on Friday for Monday’s online session.

# For the Chairman’s Notes

**Propose to capture the following Agreement:**

**…**

# Phase 1 Discussion

## Issue 1: Resource compatibility between the two parents

In RAN3#112-e, RAN3 send a LS to RAN1 asking for RAN1 feedback on IAB resource multiplexing and 3 options:

For scenario 1 and 2, RAN3 considers the following solutions (other solutions are not precluded) for the resource coordination between the parent link and the child link:

* Option 1: The child node’s gNB-DU cell resource configuration is matched to the parent node’s gNB-DU’s resource configuration.
* Option 2: The parent node’s gNB-DU resource configuration is matched to the child node’s gNB-DU’s resource configuration.
* Option 3: A boundary node should connect only to a new parent with which it has a non-conflicting TDD and H/S/NA pattern beforehand.

For Scenario 2, RAN3 considers the following solutions (other solutions are not precluded) for the coordination between two parent links:

* Option 1: The gNB-DU cell resource configuration of the parent node controlled by the F1-terminating donor of the boundary node, is matched to another parent’s gNB-DU’s resource configuration.
* Option 2: The gNB-DU cell resource configuration of the parent node controlled by the non-F1-terminating donor of the boundary node, is matched to another parent’s gNB-DU’s resource configuration.
* Option 3: The secondary leg of a boundary node is established only towards a secondary parent whose H/S/NA configuration is compatible with the H/S/NA configuration of the master parent beforehand.

RAN1 reply LS ([1]) states:

RAN1 note that Option 1 and Option 2 may cause service interruption to child IAB nodes and associated UEs for network topologies without proper resource coordination and Option 3 is very restrictive.

RAN1 notes that all above options are feasible also for semi-matched configurations, where not all DL and UL slots match, albeit with a reduced performance. Additionally, reconfigurations of the parent and/or child resource configurations can align resource configurations before or during the inter-donor migration procedures and after to further align the migrating node(s) with its new parent node.

Contribution ([1]) and ([5]):

* For Resource coordination between parent link and child link or between parent links, option 1 and option 2 are both supported for the resource coordination.

**Q1: Please share your view whether it is acceptable that “option 1 and option 2 are both supported”.**

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| **Company** | **Comment** |
| **Ericsson** | **No.** This issue has been concluded at RAN3#114-e with the following agreement (that is, by the way, encompassing both options and does not mandate anything): **For Resource compatibility between the two parents, CU1 and CU2 coordinate with each other.** So, there is nothing more to say on this topic and we are against discussing this any further |
| Huawei | Maybe we should be clear, for either options, the standard impacts/updates are actually the same, i.e. anyway resource should be exchanged, then it is up to implementation on which is to be matched. If this is the common understanding, we think both options could be supported. Our intention is not to introduce additional spec impacts. |
| Samsung  | We share the same view as E///. We can develop our spec. based on agreement list by E///.  |
| Nokia | We prefer to agree that “option 1 and option 2 are both supported”, but we can accept the majority view.  |
| Qualcomm | We agree with Ericsson. |
| ZTE | The information exchange needed for option 1 and 2 has already been agreed to be supported. And we agree that it’s up to implementation how to match the resources. |
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**Summary:**

Suggest following proposal:

**Proposal**

## Issue 2: F1AP impact

**\* Whether need enhancement in F1AP messages (F1 SETUP REQUEST, GNB-DU CONFIGURATION UPDATE, GNB-CU CONFIGURATION UPDATE messages).**

Contribution ([1]): F1AP messages (F1 SETUP REQUEST, GNB-DU CONFIGURATION UPDATE, GNB-CU CONFIGURATION UPDATE messages) need to be enhanced to include IAB specific UFD pattern in Intended TDD DL-UL Configuration NR IE, and time/frequency domain HSNA configuration information for CLI management.

**\* whether use gNB-DU UE F1AP ID to identify the child IAB node**

Regarding on how to identify the child IAB node, contribution [1][2][5] propose to use gNB-DU UE F1AP ID.

**\* Information to be included in F1AP GNB-DU RESOURCE CONFIGURATION message.**

Contribution ([1]):

* F1AP GNB-DU RESOURCE CONFIGURATION message needs to be enhanced to transfer parameters for frequency domain multiplexing support, including Rel-17 frequency-domain IAB-DU-Resource-Configuration-H/S/NA-Config, RB Set Configuration, Frequency Domain H/S/NA Configuration Reference SCS.
* Frequency Domain IAB-DU Resource Configuration needs to be added in F1AP message for TDD, FDD UL/DL respectively.
* Frequency information and Carrier List info which indicates the SCS-specific carriers of DU cell needs to be added in the F1AP GNB-DU RESOURCE CONFIGURATION message for the child DU cells so that the parent node could determine the location of each RB set.
* F1AP needs to be enhanced to transfer parent IAB DU’s time domain/frequency domain resource configuration for DC scenario, via GNB-DU RESOURCE CONFIGURATION message.
* The enhancement to the *gNB-DU Cell Resource Configuration* IE is:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **HSNA Frequency Domain Configuration List** |  | 0..1 |  |  |  |  |
| >Reference Subcarrier Spacing | M |  | ENUMERATED (kHz15, kHz30, kHz60, kHz120, spare3, spare2, spare1, …) | Indicates reference SCS to be applied to HSNA Frequency Domain Configuration Item at a given IAB-DU's cell. |  |  |
| >RB Set Configuration | M |  | ENUMERATED (2, 4, 8, 16, 32, 64,...) | Indicates the RB set size in number of PRBs used for frequency domain H/S/NA configuration of a given IAB-DU's cell, as specified in 38.213. |  |  |
| >**HSNA Frequency Domain Configuration Item** |  | 1..<*maxnoofHSNASlots*> |  |  |  |  |
| >>>HSNA Downlink List |  | *1..<maxnoofRBSets>* |  |  | - |  |
| >>>>HSNA Downlink | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) | HSNA value for downlink symbols for each RB set in a slot. |  |  |
| >>>HSNA Uplink List |  | *1..<maxnoofRBSets>* |  |  | - |  |
| >>>>HSNA Uplink | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) | HSNA value for uplink symbols for each RB set in a slot.  |  |  |
| >>>HSNA Flexible List |  | *1..<maxnoofRBSets>* |  |  | - |  |
| >>>>HSNA Flexible | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) | HSNA value for flexible symbols for each RB set in a slot.  |  |  |

Contribution ([2]):

* *Activation Timing* IE. (Moderator’s NOTE: This will be discussed later once the Xn part is agreed)
* The enhancement to the *gNB-DU Cell Resource Configuration* IE is:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **HSNA Configuration List** |  | 1..<*maxnoofRBSets*> |  |  | - |  |
| >Resource Block Set Index | O |  | INTEGER(1..<*maxnoofRBSets*>) |  | - |  |
| >Reference SCS | O |  | ENUMERATED (scs15, scs30, scs60, scs120)  | Indicates the reference SCS of the cell HSNA configuration. |  |  |
| **>HSNA Slot Configuration List** |  | 1..<*maxnoofHSNASlots*> |  |  |  |  |
| **>>HSNA Slot Configuration Item** |  |  |  |  | - |  |
| >>>HSNA Slot Configuration Index | O |  | INTEGER(1..5120) |  | - |  |
| >>>HSNA Downlink | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) |  | - |  |
| >>>HSNA Uplink | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) |  | - |  |
| >>>HSNA Flexible | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) |  | - |  |

Contribution ([5]):

* The enhancement to the *gNB-DU Cell Resource Configuration* IE is:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RB Set Size | O |  | ENUMERATED (2, 4, 8, 16, 32, 64, …) |  |  |  |
| RB Set SCS | O |  | ENUMERATED (scs15, scs30, scs60, scs120, ...) | The values scs15, scs30, scs60 and scs120 corresponds to the sub carrier spacing in TS 38.104 [17]. |  |  |
| IAB HSNA Slot Configuration List |  | 0..1 |  |  |  |  |
| >Link ID Per-link Configuration | O |  | gNB-DU UE F1AP ID | Indicates whether the configuration pertain only for one link. If omitted, the configuration applies to whole DU cell.  |  |  |
| >HSNA Slot Configuration Item list |  | 0..1 |  |  |  |  |
| >>HSNA Slot Configuration Item |  | 1..<*maxnoofHSNASlots* > |  |  |  |  |
| >>>HSNA RB Set Configuration Item |  | 1..<maxnoofRBSets> |  |  |  |  |
| >>>>HSNA Downlink | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) | HSNA value for downlink symbols in a slot. | - |  |
| >>>>HSNA Uplink | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) | HSNA value for uplink symbols in a slot. | - |  |
| >>>>HSNA Flexible | O |  | ENUMERATED (HARD, SOFT, NOTAVAILABLE) | HSNA value for flexible symbols in a slot. | - |  |

Contribution ([6]):

* Extension to *Intended TDD DL-UL Configuration* IE
* *gNB-DU Cell Resource Configuration* IE should be extended to include an instance of RB Set Configuration, Frequency-domain HSNA Configuration, Child-specific NA Resource Configuration
* Add Child-node’s Frequency Configuration, parent-node’s resource configuration, and Peer DU Resource Configuration to GNB-DU RESOURCE CONFIGURATION message

**Q2: Please share your view on following F1AP aspects:**

* **Q2-1: Whether need enhancement in F1AP messages (F1 SETUP REQUEST, GNB-DU CONFIGURATION UPDATE, GNB-CU CONFIGURATION UPDATE messages).**
* **Q2-2: whether use gNB-DU UE F1AP ID to identify the child IAB node**
* **Q2-3: whether it is agreeable for the Extension to *Intended TDD DL-UL Configuration* IE in Contribution ([6])**
* **Q2-4: The information to be included in GNB-DU RESOURCE CONFIGURATION message.**
* **Q2-5: Information to be included in *gNB-DU Cell Resource Configuration* IE and preference on IE structure from contribution ([1]), [2] ([5]), or ([6]).**

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| **Company** | **Comment** |
| **Ericsson** | **2-1: No –** in 38.473, only the GNB-DU RESOURCE CONFIGURATION message, *Intended TDD DL-UL Configuration* IE and *gNB-DU Cell Resource Configuration* IE are affected.**2-2: Yes****2-3: With modification**: the *Permutation* IE should be placed above “>>>Both DL and UL”2-4: On the top level of the GNB-DU RESOURCE CONFIGURATION we only need: 1) **a flag indicating whether the info therein is for a child boundary DU**, and 2) the **gNB-CU UE F1AP ID + gNB-DU UE F1AP ID of the child boundary MT**. All the new info should go directly into *the gNB-DU Cell Resource Configuration* IE.**2-5: we prefer the design in [2]**, where the new info includes, for each RB set (maxnoofRBSets = 8):* RB set index.
* Reference SCS.
* List of HSNA config per slot (maxnoofHSNASlots = 5120).
 |
| Huawei | Q2-1: yes, anyway, F1 AP message needs to be updated, we are open to discuss how to update, F1 SETUP and CONFIGURATION UPDATE should be good candidates.Q2-2: we are open. If we reuse NUA F1 message, maybe there is no need to introduce UE F1AP ID?Q2-3: yesQ2-4: yesQ2-5: yes. No strong opinion on the stage 3 details, in general, it should be as clean as possible. |
| Samsung  | Q2-1: according to [1], the enhancement to existing F1 procedure is essentially to enhance an IE in side. So, Q2-1 may be misleading since it gives impression that an dedicated new IE will be added to those existing procedures. Q2-2: YesQ2-3: Yes Q2-4: Yes Q2-5: no strong view as long as the enhancement is reflected correctly in a clean way.  |
| Nokia | Q2-1: No, only GNB-DU RESOURCE CONFIGURATIONQ2-2: prefer to use same ID as discussed in CB#1302Q2-3: YesQ2-4: YesQ2-5: Can be a combination of [2], [5] and [6]. [5] assumed implicit indexing of RB sets by configuring them in the ascending order. We are fine with explicit indexing like in [5] and [6]. [5] covers also the option for per-link configuration. |
| Qualcomm | Q2-1: **No**. In our view, only the following IEs should be updated:* Intended TDD DL-UL Configuration
* GNB-DU RESOURCE CONFIGURATION
* gNB-DU Cell Resource Configuration

Q2-2: **Yes.**Q2-3: **Yes**. In response to Ericsson’s comment “*Permutation* IE should be placed above “>>>Both DL and UL””:* The “Permutation” IE is only applicable for the slots where we have “Both DL and UL”, so it should be placed below “>>>Both DL and UL”.

Q2-4: “GNB-DU RESOURCE CONFIGURATION” currently carries the following main information: (i) cell resource configuration for all the activated cells served by the DU, and (ii) information about cell resource configuration and other cell-specific/common configurations of the child-nodes’ cells. “GNB-DU RESOURCE CONFIGURATION” message should be extended to capture the following new elements (as agreed by RAN1):* Child-node’s frequency configuration,
* Parent-node’s DU cell resource configurations
* DU cell resource configurations + cell-specific/common configurations of the neighboring IAB-node(s)/donor(s)

Q2-5: we prefer the proposed IE structure in [6], and think the following information should be added to “gNB-DU Cell Resource Configuration”:* RB Set Configuration: allowing to flexibly configure 1 or multiple (up to 8) RB sets with a common RB Set Size, and a reference SCS.
* Frequency-domain HSNA configuration: a list of HSNA config per slot, and per RB set
* Child-specific NA resource configuration, per child IAB-MT.
 |
| ZTE | Q2-1: yes, according to RAN1 agreements, IAB-DU resource configuration of neighbour cells needs to be informed to the IAB-DU. Currently GNB-CU CONFIGURATION UPDATE message is used to inform the Intended TDD DL-UL Configuration of neighbour cells. So it’s straight forward that this message is enhanced to included also HSNA resource configuration. And adding IAB-DU resource configuration of neighbour cells in the GNB-DU RESOURCE CONFIGURATION message is another option. Q2-2: Yes, but we think the child IAB-MT ID (i.e. gNB-DU/CU UE F1AP ID) in the F1AP GNB-DU RESOURCE CONFIGURATION message could be reused for the Per-child MT link-NA resource configuration. And there is no need to add a list of associated child IAB-MT IDs additionally. Q2-3: Yes Q2-4: Yes Q2-5: we prefer the IE structure from [1] |
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**Summary:**

Suggest following proposal:

**Proposal .**

## Issue 3: XnAP impact

**\* whether a new XnAP procedure is needed**

Contribution [1]: a new XnAP procedure is introduced, and uses UE-Associated signaling. The XnAP ID is retained after UE Context Release

 **\* whether use same new Xn procedure for the exchange of QoS info/BAP parameters, and for the coordination of resource configuration**

Contribution ([3]) propose the new Xn procedure introduced for the exchange of QoS info/BAP parameters is also used for the coordination of resource configuration.

 **\* whether revert previous agreement and only use the new XnAP procedure for resource coordination**

Contribution ([2]) propose to revert the previous agreement (as below), and Only use the new XnAP procedure

**The F1-terminating donor of the boundary node forwards the boundary IAB node’s resource configuration information to the non-F1-terminating donor, via following XnAP procedures:**

* **retrieve UE context procedure,**
* **handover preparation procedure,**
* **SN addition procedure,**
* **MN initiated SN modification procedure.**
* **SN initiated SN modification procedure**

**\* Whether need enhancement in XnAP messages (i.e. XN SETUP REQUEST/RESPONS, NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message) to include IAB specific UFD pattern in *Intended TDD DL-UL Configuration NR* IE, and time/frequency domain** **HSNA configuration information for CLI management.**

Contribution [1]: XnAP messages (i.e. XN SETUP REQUEST/RESPONSE, NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message) need to be enhanced to include IAB specific UFD pattern in Intended TDD DL-UL Configuration NR IE.

 **\* Whether need enhancement on Time alignment of resource configurations across nodes**

Contribution ([2]): To ensure a synchronous activation of new semi-static resource configurations, the System Frame Number and the Slot Index from which the configuration is valid is added to the XnAP and the F1AP signalling.

Contribution ([3]) ([5]): No enhancements to be made to further improve time alignment of resource configurations across nodes.

NOTE: the impact to F1AP will be discussed later.

**\* Detailed info to be exchanged over Xn, and the Structure of the IE**

Last meeting agreed following info to be exchanged over Xn:

* **Activated cell list.**
* **H/S/NA resource configurations.**
* **DL/UL resource configurations.**
* **Multiplexing info.**
* **Cell specific signal/channel configurations, including at least: SSB information, CORESET 0, and RACH configurations) from/for different parent nodes.**
* **other higher layer parameters listed in R1-2110573**

Contribution ([1]) proposes:

* boundary DU’s cell specific signal/channel configurations needs to be transferred via XnAP messages as well.
* transfer parent IAB DU’s time domain/frequency domain resource configuration for DC scenario, e.g. via SN addition procedure, MN initiated SN modification procedure, SN initiated SN modification procedure.

Contribution ([2]) proposes following:

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| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| **Activated Cells List** |  | *0.. 1* |  | List of cells configured in the boundary gNB-DU | YES | reject |
| **>Activated Cells Item** |  | *1.. <maxnoofServedCellsIAB>* |  |  | EACH | reject |
| >>NR CGI | M |  | 9.2.2.7 |  | - |  |
| >>Multiplexing Info | O |  | 9.2.2.b | Contains information on multiplexing with cells configured for collocated IAB-MT. Defined in TS 38.473 [x], section 9.3.1.108. | - |  |
| >>HSNA resource Configurations | M |  | 9.2.2.c | Contains Hard, Soft, N/A information and DL/UL configurations for either TDD or FDD configurations. | - |  |
| >>IAB STC Info | O |  | 9.2.2.d | STC configuration of boundary-node IAB-DU’s cell. Defined in TS 38.473 [x], section 9.3.1.109. | - |  |
| >>RACH Config Common | O |  | OCTET STRING | Corresponds to the *rach-ConfigCommon* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>RACH Config Common IAB | O |  | OCTET STRING | Corresponds to the IAB-specific *rach-ConfigCommonIAB-r16* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>CSI-RS Configuration | O |  | OCTET STRING | Corresponds to the *NZP-CSI-RS-Resource* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>SR Configuration | O |  | OCTET STRING | Corresponds to the *SchedulingRequestResourceConfig* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>PDCCH Configuration SIB1 | O |  | OCTET STRING | Corresponds to the *PDCCH-ConfigSIB1* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>SCS Common | O |  | OCTET STRING | Corresponds to the *subCarrierSpacingCommon* as defined in subclause 6.2.2 of TS 38.331 [8]. | - |  |
| **Parent gNB-DU Served Cells List** |  | *0.. 1* |  | This information is present when a secondary leg for a DC-capable boundary IAB-node is set up. The information pertains to the resources allocated to the boundary IAB-MT on the existing leg. | YES | reject |
| **>Parent gNB-DU Served Cells Item** |  | *1.. <maxnoofServedCellsIAB>* |  |  | EACH | reject |
| >>NR CGI | M |  | 9.2.2.7 |  | - |  |
| >>Multiplexing Info | O |  | 9.2.2.b | Contains information on multiplexing with cells configured for collocated IAB-MT. Defined in TS 38.473 [x], section 9.3.1.108. | - |  |
| >>HSNA resource Configurations | M |  | 9.2.2.c |  | - |  |
| >>IAB STC Info | O |  | 9.2.2.d | STC configuration of boundary-node IAB-DU’s cell. Defined in TS 38.473 [x], section 9.3.1.109. | - |  |
| >>RACH Config Common | O |  | OCTET STRING | Corresponds to the *rach-ConfigCommon* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>RACH Config Common IAB | O |  | OCTET STRING | Corresponds to the IAB-specific *rach-ConfigCommonIAB-r16* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>CSI-RS Configuration | O |  | OCTET STRING | Corresponds to the *NZP-CSI-RS-Resource* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>SR Configuration | O |  | OCTET STRING | Corresponds to the *SchedulingRequestResourceConfig* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>PDCCH Configuration SIB1 | O |  | OCTET STRING | Corresponds to the *PDCCH-ConfigSIB1* as defined in subclause 6.3.2 of TS 38.331 [8]. | - |  |
| >>SCS Common | O |  | OCTET STRING | Corresponds to the *subCarrierSpacingCommon* as defined in subclause 6.2.2 of TS 38.331 [8]. | - |  |
| Activation Timing | O |  |  |  | - |  |
| >Activation SFN | M |  | INTEGER(0..1023) | Indicates from which SFN of the receiving node the configuration is valid. | - |  |
| >Activation Slot Index | O |  | INTEGER(0..319) | Indicates from which slot of the indicated SFN of the receiving node the configuration is valid. | - |  |

Contribution ([4]) proposes following:

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| --- | --- | --- | --- | --- | --- | --- |
| **Activated Cells List** | O | 0..1 |  | List of cells served by the collocated IAB-DU. | YES | ignore |
| **>Activated Cells List Item** |  | *1 .. <maxnoofServedCellsIAB >* |  |  | EACH | ignore |
| >>NR CGI  | M |  | 9.2.2.7 |  | - |  |
| >>IAB STC-Info | O |  | 9.2.2.x1 | Contains cell SSB Transmission Configuration (STC) information of an IAB-DU or IAB-donor-DU. | - |  |
| >>ControlResourceSetZero | O | INTEGER (0..15) |  | This IE is to configure CORESET#0 of the initial BWP (see TS 38.213 [40], clause 13). | - |  |
| >>RACH Config Common | O |  | OCTET STRING | Corresponds to the rach-ConfigCommon as defined in subclause 6.3.2 of TS 38.331 [10]. | - |  |
| >>RACH Config Common IAB | O |  | OCTET STRING | Corresponds to the IAB-specific rach-ConfigCommonIAB-r16 as defined in subclause 6.3.2 of TS 38.331 [10]. | - |  |
| >>Multiplexing Info | O |  | 9.2.2.x2 | Contains information on multiplexing with cells configured for collocated IAB-MT. | - |  |
| >>RB Sets List  | O | 0..1 |  | List of non-overlapping RB sets in a DU cell. |  |  |
| >>>RB Sets List Item |  | ENUMERATED (4,8,16) |  |  | - |  |
| >>>> RB Set Configuration | O |  | 9.2.2.x3 | Contains the information on staring frequency point and the number of PRBs of an RB set | - |  |
| >>>>CHOICE IAB-DU Cell Resource Configuration-Mode-Info | O |  |  |  | - |  |
| >>>>>TDD |  |  |  |  | - |  |
| >>>>>>TDD Info |  | *1* |  |  | - |  |
| >>>>>>>gNB-DU Cell Resource Configuration-TDD | M |  | gNB-DU Cell Resource Configuration 9.2.2.x4 | Contains TDD resource configuration of gNB-DU’s cell. | - |  |
| >>>>>FDD |  |  |  |  | - |  |
| >>>>>>FDD Info |  | *1* |  |  | - |  |
| >>>>>>>gNB-DU Cell Resource Configuration-FDD-UL | M |  | gNB-DU Cell Resource Configuration 9.2.2.x4 | Contains FDD UL resource configuration of gNB-DU’s cell. | - |  |
| >>>>>>> gNB-DU Cell Resource Configuration-FDD-DL | M |  | gNB-DU Cell Resource Configuration 9.2.2.x4 | Contains FDD DL resource configuration of gNB-DU’s cell. | - |  |

Contribution ([6]):

* Add Peer DU Resource Configuration in *Served Cell Information NR* IE

**Q3: Please share your view on following XnAP aspects:**

* **Q3-1: whether a new XnAP procedure is needed**
* **Q3-2: whether use same new Xn procedure for the exchange of QoS info/BAP parameters, and for the coordination of resource configuration**
* **Q3-3: whether revert previous agreement and only use the new XnAP procedure for resource coordination**
* **Q3-4: Whether need enhancement in XnAP messages (i.e. XN SETUP REQUEST/RESPONS, NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message) to include IAB specific UFD pattern in *Intended TDD DL-UL Configuration NR* IE, and time/frequency domain** **HSNA configuration information for CLI management.**
* **Q3-5: Whether need enhancement on Time alignment of resource configurations across nodes**
* **Q3-6: Detailed info to be exchanged over Xn, and preference on IE structure from contribution [2], [4], ([6]).**

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| --- | --- |
| **Company** | **Comment** |
| **Ericsson** | **3-1: Yes,** legacy messages are too complex already3-2: Our concern is that the F1 Transport Migration messages could become too large. However, it was previously agreed that the QoS info can be exchanged in several messages, so this is **OK (2a: The QoS info can be passed gradually using multiple Xn messages.).****3-3:** **Yes,** this is a consequence of a “Yes” to 3-1 and 3-2.3-4: The **UFD** is added to ***Intended TDD DL-UL Configuration NR* IE**. The **time/frequency domain HSNA configuration** information is added to the **messages of the new XnAP procedure**. Why do we mention these other legacy messages?**3-5: Yes**, and **especially if we agree to use the same new XnAP procedure for resource MUXing info and QoS info exchange**. In this case, the info may be large and hence cannot be exchanged in a single procedure execution, so the configuration timing gap needs to be addressed by indicating when exactly the new configuration starts to be valid.3-6: we **prefer the design in [2].** A few comments on [4]:* We prefer to use a new XnAP procedure.s
* *>>RB Sets List*: “*List of non-overlapping RB sets in a DU cell*.”
	+ E///: They should also be contiguous.
* *>>>RB Sets List Item*
	+ E///: Should be 1…8 (Max 8 RB sets)
* *>>>> RB Set Configuration*: “*Contains the information on staring frequency point and the number of PRBs of an RB set*”.
	+ E///: Since sets are contiguous, only 1 starting point is needed (not per set). Also, there is no RAN1 agreement on starting frequency point. One suggestion is to always start from the lowest frequency resource block (RB). Otherwise maybe it is good to have a RAN1 decision first.
* In the RB set configuration IE 9.2.2.x3, it could be good to add/include the RAN1 agreement on “reference SCS”
* We should include the RAN1 agreement “*[N is at least the # PRBs corresponding to the MT’s configured #PRB of an RBG]*”
	+ There is a RAN1 agreement on additional multiplexing info for FDM required
	+ In 9.2.2.x4, the FDM H/S/NA should be included
 |
| Huawei | Q3-1: maybe not neededQ3-2: not needed, since we have already specified resource configuration exchange related procedure, we just need to add new info in the place where current resource coordination info IEs are located.Q3-3: not needed.Q3-4: maybe not.Q3-5: maybe not.Q3-6: as proponent of [4], of course we prefer [4], but we are open for further discussion and refinements. |
| Samsung  | Q3-1: yes Q3-2: yesQ3-3: yes. We are failure to understand the benefit to introduce the multiplexing information into so many procedures. From procedure point of view, when the resource multiplexing needs update, the new XnAP message has the same effect as the existing message. However, if such resource multiplexing is updated together with the update of the offloaded traffic (e.g., the resource update requires to add or revoke some traffic to CU2), such new XnAP message can achieve this in one procedure. However, if the existing procedure is used, the signaling procedure becomes to use existing procedure to update resource, and then use new XnAP procedure to update offloading. Meanwhile, the specification change becomes significant if we introduce this in existing message. In addition, if we use new XnAP procedure, we can have a clean design which is dedicated for IAB. Q3-4: no Q3-5: no. Is this an optimization?Q3-6: prefer to [2]. Details can be further checked later.  |
| **Nokia** | Q3-1: maybe not needed. Complex may be not a good argument. This depends on when the info is exchanged, e.g. during HO preparation procedure. Q3-2: yes.Q3-3: not needed.Q3-4: No, UFD can be in the Intended TDD DL-UL Configuration IEQ3-5: No, the problem may be rare and could have very limited durationQ3-6: prefer the IE structure in [2], but not for the new procedure.  |
| Qualcomm | Q3-1: We should not introduce yet another new procedure if we can use the new Xn procedure for QoS info/L2 info.Q3-2: Yes.Q3-3: Yes.Q3-4: Yes.Q3-5: No. Q3-6: we prefer the design proposed in [6]. |
| ZTE | Q3-1: no, the same new Xn procedure for the exchange of QoS info/BAP parameters could be used for resource configuration update. Q3-2: yes Q3-3: no strong view Q3-4: yes, the new Xn procedure for QoS info/L2 info is supposed to be performed between F1-terminating and non F1-terminating donor, and it’s related to the boundary MT. However, according to RAN1 agreements, time/frequency domain HSNA configuration information need to be exchanged between neighbouring IAB-nodes/IAB-donors for for CLI management. So it’s not appropriate to add the resource configuration of neighbouring IAB-nodes/IAB-donors in the the new Xn procedure for QoS info/L2 info. Q3-5: no  |
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**Summary:**

Suggest following proposal:

**Proposal .**

## Any other issues

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| **Company** | **Comment** |
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# Phase 2 Discussion

# Conclusion, Recommendations

# References

1. R3-220142, Discussion on resource multiplexing in IAB (ZTE)
2. R3-220166, (TP for IAB BL CR for TS 38.423 and TS 38.473) Inter-Donor Resource Coordination in IAB Networks (Ericsson)
3. R3-220297, IAB multiplexing enhancements (Qualcomm Incorporated)
4. R3-220805, (TP for NR\_IAB\_enh BL CR for TS 38.423) IAB resource multiplexing (Huawei)
5. R3-220825, (TP for BL CR for TS 38.473) Resource multiplexing (Nokia, Nokia Shanghai Bell)
6. R3-220590, PHY layer configurations for Rel-17 IAB (Qualcomm Incorporated)