3GPP TSG RAN WG1 Meeting #106bis-e R1-211xxxx

11th October – 19th October 2021

Agenda Item: 8.10

Source: Moderator (Qualcomm Incorporated)

Title: Draft moderator summary of [106bis-e-R17-RRC-eIAB] Email discussion on Rel-17 RRC parameters for eIAB

Document for: Discussion and decision

This document provides a summary of the following email discussion on upper layer parameters to support eIAB physical layer operation:

[106bis-e-R17-RRC-eIAB] Email discussion on Rel-17 RRC parameters for eIAB – Luca (Qualcomm)

* 1st check point: October 14
* Final check point: October 19

The starting point from the discussion is largely based on the outcome of the post RAN1#106-e email discussion *“[Post-106-e-Rel17-RRC-10] Summary of email discussion on RRC parameters for eIAB*”, which is summarized in [1].

Additional input was provided in [2]:

|  |  |
| --- | --- |
| EricssonR1-2110333 |  |

The moderator assessment is that the proposal in [2] makes sense, however it should be discussed and agreed as part of the 8.10.1 agenda item.

As a result it is recommended to use as a starting point the output from [1], which is included below.

It is also recommended that until further notice we continue the discussion using this format. In the meantime the moderator will start preparing the required xls format as per the guidance from [3].

| **Param. ID** | **Sub-feature group** | **New or existing parameter** | **Parameter name in specification** | **Description** | **Value range** | **Default value** | **IAB node specific/IAB nodes common** | **Specification** | **Signaling** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P01 | Resource multiplexing | New | Rel-17 frequency-domain IAB-DU-Resource-Configuration-H/S/NA-Config (final name in specification to be determined by RAN2/3) | Indicates H/S/NA attributes per RB set, per D/U/F resource type within a slot. | {Hard, Soft, Not Available} per RB set, per resource type in a slot [TBD relative to IAB-DU-Resource-Configuration-TDD-Config]  |  | IAB node specific |  | **F1AP** | **RAN1 #105-e**AgreementFor frequency domain multiplexing, H/S/NA configurations for an IAB-node are provided separately in addition to the Rel-16 H/S/NA**Agreement**If an IAB node is configured with a frequency-domain H/S/NA configuration down select between the following options:* Alt. 1 Either the Rel-16 H/S/NA configuration or frequency domain configuration is applied for a given resource
	+ FFS: Whether configurations are switched with per-slot, per-resource type within a slot, or per-symbol granularity
* Alt. 2 The Rel-16 H/S/NA configuration and frequency domain configuration are jointly applied

**RAN1 #106-e****Agreement**The semi-static configuration of H/S/NA resource type in frequency domain is provided per RB set, per D/U/F resource type within a slot. |
| P02 | Resource multiplexing | New | RB Set Configuration | Indicates the RB set size in number of PRBs used for frequency domain multiplexing between given IAB-DU and IAB-MT cells | * List of values {2, 4, 8, 16, 32, 64}
* [N is at least the # PRBs corresponding to the MT’s #PRB of an RBG]
* FFS: Value(s) in case of multiple configured BWPs at the IAB-MT
 |  | IAB node specific |  | **F1AP** | **RAN1 #105-e****Agreement**The minimum resource size for configuring the frequency domain granularity is a set of N RBs:• Candidate values for N: {4, 8, 16, other values TBD}• N is at least the # PRBs that are corresponding to the MT’s # PRBs of an RBG).FFS: Scaling or configuration of N based on system BW or size of IAB-MT BWP**RAN1 #106-e****Agreement**N is a configured number of PRBs, where the CU configures N* N = {2, 4, 8, 16, 32, 64}
* FFS: Value(s) of N in case of multiple configured BWPs at the IAB-MT
* This agreement does not revert any existing RAN1 agreement

**Requires intra/inter CU coordination:** No |
| P03 | Resource multiplexing | New | Frequency Domain H/S/NA Configuration Reference SCS | Indicates reference SCS to be applied to Rel-17 IAB-DU-Resource-Configuration-H/S/NA-Config at the IAB-DU | FR1: {15kHz, 30kHz, 60kHz}FR2: {60kHz, 120kHz} |  | IAB node specific |  | **F1AP** | **RAN1 #106-e****Agreement**A Reference SCS is configured for frequency domain H/S/NA configuration.**Requires intra/inter CU coordination:** No |
| P05 | Resource multiplexing | New | Peer Parent Common Resource Configuration | Indicates the semi-static and/or cell-common higher layer configuration (e.g. SSB, CORESET 0, and RACH and configurations) from/for different parent nodes. | TBD (at least cell-common higher layer configuration (e.g. SSB, CORESET 0, and RACH and configurations) |  | IAB node specific |  | **F1AP and Xn** | **RAN1 #106-e****Agreement**For intra-donor and inter-donor DC scenarios, coordinating the semi-static and/or cell-common higher layer configuration (e.g. SSB, CORESET 0, and RACH and configurations) from/for different parent nodes. |
| P10 | Resource multiplexing | New | Rel-17 Desired Guard Symbols  | Number of symbols the IAB node would like the parent IAB node not to use at the edge (beginning or end) of a slot for Case #6 and Case #7 timing cases when there is a transition between the IAB node MT and DU per cell  | FFS |  | IAB node specific | Resource multiplexing | **MAC-CE** | **RAN1 #106-e****Agreement**MAC-CE signaling of Desired/Provided Guard Symbols is enhanced (e.g. using the same Rel-16 MAC-CE design) to support indication of guard symbols additionally required for Case #6 and Case #7 timing cases.* FFS: Number of guard symbols associated with Case #6 and Case #7 timing modes
* FFS: Need for explicit indication of guard symbols switching between timing cases
 |
| P11 | Resource multiplexing | New | Rel-17 Provided Guard Symbols  | Number of symbols the IAB node uses at the edge (beginning or end) of a slot for Case #6 and Case #7 timing cases when there is a transition between the IAB node MT and DU at the child node per cell | FFS |  | IAB node specific | Resource multiplexing | **MAC-CE** |
| P12 | FFS: Resource multiplexing or Interference management | New | *Child IAB-DU Restricted Beam Indication* | Signaling from an IAB-node/IAB-donor to a child node indicating beams of the child IAB-DU in the direction of which simultaneous operation is restricted | FFS |  | IAB node specific | Resource multiplexing | **MAC-CE** | **RAN1 #106-e****Agreement**MAC-CE signaling from a parent node is supported for indication of beams of an IAB-DU in the direction of which simultaneous operation is restricted* FFS: Details of beam indication (e.g. TCI state ID, Spatial relation information ID, RS ID (including CSI-RS, SRS, SSB, etc.))
* FFS: Applicability to other beams

**Agreement****Spatial domain restrictions from a parent node or recommendations from a child node is limited to a subset of time resources in which simultaneous operation is applied.*** **FFS: Handling of frequency resources in case of FDM operation**
* **FFS: Support for implicit/explicit indication of the simultaneous operation mode**
 |
| P13 | Interference management | Existing parameter | *Intended TDD DL-UL Configuration* | Rel-16 *Intended TDD DL-UL Configuration* is extended to support IAB-specific UFD patterns. | Permutation: ENUMERATED (DFU, UFD, …) | DFU | IAB node specific |  | **F1AP and Xn** | **RAN1#105-e**AgreementRel-16 CLI coordination signalling (Intended TDD DL-UL Configuration) is extended to support IAB specific UFD patterns.FFS: Support the exchange of IAB-DU H/S/NA resource configuration information among neighbouring IAB-nodes/IAB-donors for CLI management purposes. |
| P14 | FFS: Resource multiplexing or Interference management | New | Peer DU Resource Configuration | Indicates the DU resource configuration (UL/DL/FL, H/S/NA) of the peer IAB-node or donor DU that can be used for resource coordination in case of DC, and/or for interference management | *(Rel-16) gNB-DU Cell Resource Configuration* (which includes SCS, DUF TX periodicity, DUF config, HSNA periodicity and HSNA config) *+ (Rel-17 frequency-domain) gNB-DU Cell Resource Configuration* (which includes “Rel-17 IAB-DU-Resource-Configuration-H/S/NA-Config”, “RB Set Configuration”, and “Frequency Domain H/S/NA Configuration Reference SCS”) |  | IAB node specific |  | **F1AP and Xn** | **RAN1#106-e****Agreement****For intra-donor and inter-donor DC scenarios, in addition to coordination at the donor CU(s), a parent-node can be made aware of the DU resource configuration (UL/DL/FL, H/S/NA) of the other peer parent node that connects to the same IAB-node.****RAN1#106-e****Agreement**Support the exchange of semi-static Rel-16 IAB-DU H/S/NA resource configuration information and Rel-17 frequency domain IAB-DU H/S/NA resource configuration information among neighbouring IAB-nodes/IAB-donorsAlso related to parameter “Peer Parent DU Resource Configuration” as common signaling may be desirable. |
| P15 | Timing control | New | [Timing Case Indication] | The parent-node indicates to an IAB-node when (over which time resources) a timing case is performed, including:* When Case 6 timing is performed at the IAB-node.
* When Case 7 timing is performed at the parent-node.
* [FFS] when Case 7 timing is performed at the IAB-node.
* [FFS] whether the indication should be associated with another dimensions, e.g. multiplexing cases
 | FFS |  | IAB node specific |  | **FFS** | **RAN1#104-e****Agreement**Switching between Case 1, Case 6, and Case 7 timing is supported.* FFS whether Case 6 and Case 7 timing shall be restricted to certain resources, e.g. excluding resources used for access or TDM backhaul
* FFS details on switching including the switching conditions
* FFS relationship between switching timing modes with the usage/indication of different resource multiplexing modes
* FFS whether Rel-16 OTA synchronization shall be enhanced to support switching timing modes

**RAN1#105-e****Agreement**An IAB-node is indicated when Case 6 timing is performed at the IAB-node.* FFS details of the indication (e.g. semi-static and/or dynamic, implicit and/or explicit, linkage to multiplexing capability, etc.).

FFS whether an IAB-node is also indicated when Case 7 timing is performed at the IAB-node.**RAN1#106-e****Agreement**An IAB-node is explicitly indicated by the parent node when Case 6 timing is performed at the IAB-node at least for specific time resources.* FFS: whether the indication should be associated with another dimensions, e.g. multiplexing cases
* FFS whether an IAB-node is explicitly indicated by the parent node when Case 7 timing is performed at the IAB-node.

**RAN1#106-e****Agreement**An IAB-node is explicitly indicated by the parent node when Case 7 timing is performed at the parent node.FFS for signalling details |
| P16 | Timing control | New | Case7 Timing Offset | The parent-node indicates to an IAB-node an offset to be used by the IAB-MT to set its UL TX timing based on the legacy TA loop and the indicated offset. | FFS |  | IAB node specific |  | **MAC-CE** | **RAN1#106-e****Agreement**For Case 7 timing at a parent node, the IAB-MT Tx timing of the node is obtained via the legacy TA loop plus an offset from the parent node.FFS range, granularity, and signaling details of the offset. |
| P17 | Power control | New | Desired DL TX Power Adjustment | The IAB-MT indicates to its parent-node, its desired DL TX power adjustment to assist with the parent-node’s DL TX power allocation. This indication is provided at least for specific time resources and can further be associated with spatial configuration. | FFS |  | IAB node specific |  | **FFS** | **RAN1#104-e****Agreement**Support an IAB-node indicating information to assist with the DL power control of its parent-node towards the IAB-node without mandating an expected behavior at the parent node.* Note: At least the assistance information is for supporting the simultaneous operation within the IAB-node to avoid power imbalance
* FFS: type of assistance information (e.g., desired received power, power adjustment, preferred CSI-RS resource)
* FFS: whether this information is provided to the parent-node, the CU, or both.
* FFS: applicability of the assistance information (e.g. relation to beams or multiplexing modes)

FFS: the channel carrying this assistance information**RAN1#105-e****Agreement**The information to assist DL power allocation of the parent-node is indicated by the IAB-MT to the parent node DU in terms of desired power adjustment.* FFS applicability of assistance information, e.g. per multiplexing scenario, per resource, etc.

**RAN1#106-e****Agreement**The desired DL TX power adjustment, indicated by the IAB-MT to its parent-node to assist with the parent-node’s DL TX power allocation, is provided at least for specific time resources. The desired DL TX power adjustment can further be associated with spatial configuration. (e.g., MT’s DL RX beams).* FFS: signalling details, e.g. indication via MAC-CE, PUCCH, or legacy CSI framework.
 |
| P18 | Power control | New | DL TX Power Adjustment | The parent-node indicates to the IAB-node an adjustment to the parent-node’s DL TX power (e.g., in response to receiving Desired DL TX Power Adjustment from the IAB-node). This indication is provided at least for specific time resources and can further be associated with spatial configuration. | FFS |  | IAB node specific |  | **FFS** | **RAN1#106-e****Agreement**Support an IAB-node indicating adjustment to its DL TX power to a child node (e.g., in response to receiving the DL TX power assistance information from the child node) at least for specific time resources.The DL TX power adjustment indication can further be associated with spatial configuration. (e.g., MT’s DL RX beams).FFS: signalling details. |
| P19 | Power control | New | Desired IAB-MT PSD range | The IAB-node indicates to its parent-node, its desired PSD range to help with its MT’s UL TX power control.  | FFS |  | IAB node specific |  | **FFS** | **RAN1#106-e****Agreement** Support an IAB-node indicating its desired IAB-MT PSD range to help with its MT’s UL TX power control. This information is provided to the parent node.FFS: applicability of assistance information, e.g., per multiplexing scenario, per resource, etc.FFS: signaling details, including the possibility to extend PHR. |
| P20 | Dual Connectivity | New | Simultaneous Rx Tx Intra-Band | The IAB-node indicates to Donor CU on IAB-MT’s capability regarding simultaneous TX and RX within the same band.  | FFS |  | IAB node specific |  | **RRC** | **RAN1#106-e****Agreement****The IAB-donor-CU can be made aware of the IAB-MT’s capability regarding simultaneous transmission and reception on multiple serving cells in a frequency band, configured by the two parent nodes in intra-donor DC scenarios.** |
| P21 | Resource multiplexing | New | *Child IAB-MT Link NA Resource Configuration* (final name in specification to be determined by RAN2/3) | IAB-donor CU indicates, to an IAB-node/donor DU, NA attribute per D/U/F resource type within a slot, for a child IAB-MT. | {NA Downlink: ENUMERATED (true, false), NA Uplink: ENUMERATED (true, false)NA Flexible: ENUMERATED (true, false)} per slot, per child IAB-MT  |  | IAB node specific |  | **F1AP** | **RAN1#106-bis-e****Agreement:** **In DC scenarios, support per-child MT link-NA resource configuration.****This configuration can be made available to IAB node as well** |
|  |  |  |  |  |  |  |  |  |  |  |

NOTE: the Parameter ID field is an arbitrary field that was added to facilitate referencing a particular row in the parameters table when commenting.

Companies are encouraged to provide feedback on the above, in the following table:

|  |  |
| --- | --- |
| Company | Comments |
| AT&T | P12: Suggest to rename parameter as “Child IAB-DU Restricted Beam Indication”P20: May be appropriate to handle this capability indication as an IAB-MT FG in 8.17.10 instead of as a regular RRC parameterP21: Should add a new parameter “Child IAB-MT Link NA Resource Configuration” based on the following RAN1#106bis-e agreement:**Agreement:** **In DC scenarios, support per-child MT link-NA resource configuration.*** **This configuration can be made available to IAB node as well**

**Moderator’s response:**Regarding P12: the parameter name is updated as suggested. Regarding P20: this parameter is removed, since the related parameter is being discussed in 8.7.10 as a an IAB-MT feature. Regarding P21: it is added to capture the mentioned agreement. |
| Ericsson | **P10, P11:** We think we need to consider switching between all combinations of Case-1, Case-6 and Case-7, also in the direction to Case-1.**P12:** Agree with AT&T. Furthermore, we think the description field should clarify that this restriction is only valid for SDM operation and is no general restriction.In relation to P12, additionally, we think a new parameter, *Child Node Recommended Beam Indication*, will be needed for the following agreement:*The child node indication of recommended beams to the parent node can include both IAB-MT DL beams and/or IAB-MT UL beams.**FFS: Indication via MAC-CE or UCI transmission**FFS: Definition of IAB-MT DL beams and/or IAB-MT UL beams (e.g. TCI state ID, Spatial relation information ID, RS ID (including CSI-RS, SRS, SSB, etc.))**FFS: Whether indication of “not preferred” beams is supported*although some details remain to be sorted out.**P16:** MAC CE seems to be agreeable regarding signaling.**P20:** Agree with AT&T. Generally, we think that the present discussion would be helped by sorting higher layer parameters and capabilities in sections similar to what was done for Rel-16:F1AP signaling from CU to IAB-DU or Donor DURRC signaling from CU to IAB-MTMAC-CE signaling between child IAB-MT and parent**P21 (AT&T):** We agree with AT&T that new parameters should be added but we think it is a bit more complex than only adding one parameter:* Will this be one or two parameters, one for Rel-16 configuration parameters and another for Rel-17 (P01)?
* The parent gets a *configuration* and the dual connected IAB node gets *information* about this configuration. This must somehow be clarified.

**Moderator’s response:**Regarding P10 and P11: the related aspects are currently being discussed in 8.10.1. We can revisit these parameters after possible agreements in RAN1#106-bis-e.Regarding P12: it is renamed as suggested. We also note that the description already says this indication is for “simultaneous operation”. Also, P22 is added to capture “*Child Node Recommended Beam Indication*”.Regarding P16: the signaling type has been updated to MAC-CE based on the latest 8.10.2 agreements.Regarding P20: it is removed as suggested. Regarding P21: this parameter is added as suggested. The additional points about applicability of this parameter to Rel-17 frequency-domain resource configuration and providing the peer parent with the related information are indeed very important and should perhaps be discussed/agreed in 8.10.1. |
| Huawei, HiSilicon | P10: The description can be more accurate and suggest the followingNumber of symbols the IAB node would like the parent IAB node not to use at the edge (beginning or end) of a slot for Case #6 and Case #7 timing cases of IAB-MT when there is a transition between the IAB node MT and DU per cellP11: The description can be more accurate and suggest the followingNumber of symbols the IAB node uses at the edge (beginning or end) of a slot for Case #6 and Case #7 timing cases of IAB-MT when there is a transition between the IAB node MT and DU at the child node per cellP20: Fine with the suggestion from AT&T to handle this in UE capability discussion.P21: Agree to have a new parameter for per-child MT link NA resource configuration.**Moderator’s responses:**Regarding P10 and P11: the related aspects are currently being discussed in 8.10.1. We can revisit these parameters after possible agreements in RAN1#106-bis-e.Regarding P20: it is removed as suggested. Regarding P21: this parameter is added as suggested.  |
|  |  |

The parameters table has been updated with track changes enabled based on the comments in this round of discussion. Specific responses by the moderator have been included inline in the table above.

References

[1] R1- 2108685 – [Post-106-e-Rel17-RRC-10] Summary of email discussion on RRC parameters for eIAB – Moderator (Qualcomm)

[2] R1-2110333 – On RRC parameters in enhanced IAB – Ericsson

[3] R1-2110415 – Recommendations for RAN1 RRC Parameter Preparation – Moderator (Ericsson)