3GPP TSG-RAN WG1 Meeting #101-e R1-200xxxx

e-Meeting, May 25th – June 5th, 2020

**Agenda Item:** **7.2.3.3**

**Source: Moderator (AT&T)**

**Title: Summary of [101-e-NR-IAB-03]: Email discussion on IAB-DU/IAB-MT Transition Location/Type**

**Document for:** **Discussion/Approval**

# Introduction

This contribution provides a summary of [101-e-NR-IAB-03]: Email discussion on IAB-DU/IAB-MT Transition Location/Type.

# IAB-DU/IAB-MT Transition Location/Type

**Source**: R1-2003505, R1-2003544, R1-2003948, R1-2004449

**Background:** During RAN1#100-e the following conclusion was reached:

***Conclusion:*** *No consensus to adopt a TP to address the issue of transition detection or transition type determination at the parent IAB node in RAN1#100-e. Consideration of whether this issue is critical and whether specification support is necessary may be revisited in the future as several companies raised concerns that the potential impact of improper transition detection may lead to system performance degradation when guard symbols are introduced by the parent node.*

The related agreement was reached in RAN1#98:

Agreements:

A parent IAB node can be made aware of the number of symbols Ng the child IAB node would like the parent IAB node not to use at the edge (beginning or end) of a slot when there is a transition between child MT and child DU. Separately or additionally, the child IAB node can be made aware of the number of guard symbols that the parent IAB node will provide.

* Ng can be provided for each of the [8] possible transitions with potential overlap:

|  |  |  |
| --- | --- | --- |
| *MT to DU* | *DL Tx* | *UL Rx* |
| *DL Rx* |  |  |
| *UL Tx* |  |  |
| *DU to MT* | *DL Rx* | *UL Tx* |
| *DL Tx* |  |  |
| *UL Rx* |  |  |

* If Ng is not provided it is assumed to be 0

NOTE: this agreement does not introduce any performance requirement on IAB nodes.

These issues were extensively discussed during RAN1#100-e, but were not discussed during RAN1#100bis-e. Based on the preparation phase the following issues should be discusses in RAN1#101-e:

1. Specification of parent node behavior for inserting guard symbols in case of flexible symbols at the edge of a MT->DU or DU->MT transition
2. Whether determination of MT->DU and DU->MT transitions is left to IAB-node implementation in Rel-16.

## IAB-DU/IAB-MT Transition Type

One solution proposed my several companies to solve the ambiguity caused by flexible symbols at the edge of MT->DU or DU->MT transitions is to take the minimum possible number of guard symbols based on the potential transition (e.g. DL MT -> DL DU, DL MT -> UL DU, UL MT -> DL DU, UL MT -> UL DU, etc.).

**FL Proposal 2.1.1:** In presence of F symbols in the child DU configuration at the edge of a MT to DU transition (or vice versa) the parent node inserts the minimum number of guard symbols amongst the two possible transition types corresponding to child DU Tx or child DU Rx. Adopt the following TP to TS 38.213 Section14:

|  |
| --- |
| ----------------------------------------------- Start of Text Proposal --------------------------------------  < Unchanged parts are omitted >  For a serving cell of an IAB-node MT, the IAB-node MT can be provided by *guard-SymbolsProvided* a number of symbols that will not be used for the IAB-node MT in slots where the IAB-node transitions between IAB-node MT and IAB-node DU. A SCS configuration for the number of symbols is provided by *guardSymbol-SCS*.  For a transition between IAB-node MT with either uplink or downlink symbols and IAB-node DU with flexible symbols, the IAB-node may assume the number of guard symbols for the transition is equal to the smaller value of the numbers of guard symbols for a transition between the IAB-node MT with either uplink or downlink symbols and IAB-node DU with downlink symbols and the number of guard symbols for a transition between IAB-node MT with either downlink or uplink symbols and IAB-node DU with uplink symbols.  < Unchanged parts are omitted >  ----------------------------------------------- end of Text Proposal ---------------------------------------- |

**Discussion:**

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| --- | --- | --- |
| **Company** | **Do you agree with FL Proposal 2.1.1?** | **Comments** |
| Qualcomm | Yes | The proposed TP might require some modifications to remove the uncertainty (depending on the text interpretation) on the the IAB-MT side (i.e. either downlink or uplink) since there is no ambiguity on that part. In other words, the transition type on the IAB-MT side is known hence it suffices the take the minimum between the two possible transitions corresponding to the IAB-DU being downlink or uplink.  Also we would need to cover the transition in the other direction, from the IAB-DU to the IAB-MT. |

## IAB-DU/IAB-MT Transition Location

One solution was proposed to specify behaviour related to determination of a DU->MT or MT->DU transition location at the parent and child IAB nodes:

FL Proposal 2.2.1: Discuss whether the following rules for Guard symbol insertion and definitions of MT to DU and DU to MT transitions should be specified in Rel-16:

**Guard symbols are inserted by the parent node according to the advertised guard-Symbols Provided only when all the following conditions are satisfied:**

* **there is a candidate MT to DU transition or a candidate DU to MT transition,**
* **the MT is scheduled to be active at the edge of such candidate transition,**
* **the guard symbols do not overlap with a planned transmission or reception (as applicable) of NA-exempt channels by the MT.**

**A candidate MT to DU transition occurs when:**

* **the DU is configured to transition from a NA or S-NIA resource to a H or S-IA resource,**
* **the DU is configured to transition from a NA or S-NIA resource to a NA or S-NIA resource with an allocation of NA-exempt channels.**

**A candidate DU to MT transition occurs when:**

* **the DU is configured to transition from a H or S-IA resource to a NA or S-NIA resource,**
* **the DU is configured to transition from a NA or S-NIA resource with an allocation of NA-exempt channels to a NA or S-NIA resource.**

**Discussion:**

|  |  |  |
| --- | --- | --- |
| **Company** | **Do you agree with specifying the rules and definitions provided in FL Proposal 2.2.1? If these are not specified, is anything required (e.g. a note in 38.213) to clarify the expected behavior in Rel-16 in case of multi-vendor operation?** | **Comments** |
| Qualcomm | Yes, agree on the rules and definitions in FL 2.2.1, however there could be other acceptable variations. | Our main point is that no rules are defined, in case of parent node from vendor A and a child node from vendor B, it is not clear how leaving this to implementation (which could be different between vendor A and vendor B) results in a system that works well, i.e. with the parent node inserting the guard symbols exactly when the child node expects them.  We don’t thin the details of the rules are critical, as there could be various levels of optimization. However it is important that parent and child follow the same rules or there will be disconnects, leading to some system performance impact when parent and child are not aligned on the presence of guard symbols at a given boundary.  We recognize the whole scheme about these guard symbols for MT🡨🡪DU transitions is an optimization, and there was a lot of debate on the need to introduce it. Eventually, consensus was achieved on the premise that we would devise a scheme that works for all envisioned scenarios (NOTE: we chaired that discussion in RAN1 #98 offline sessions). Hence, to remain truthful to that promise, our position is that we should address this last aspect that will ensure proper inter-vendor operation.  If companies think that there is no need to specify such rules because it is clear when guard symbols should be inserted by a parent node, then either 1) every company is in agreement with the rules in the proposal 2.2.1 above or 2) there is at least one company not aligned with the others.  In case 1), there should be no issue documenting the corresponding rules. In case 2), there would the need to align the rules amongst companies (and then document them) or we would need to agree that we don’t want to properly address the inter-vendor scenario in Rel-16. |

# Summary

TBD