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-01]: Response to RAN2 LS on IAB Guard Symbols**

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

# Introduction

This contribution provides summary of email discussion [101-e-NR-IAB-01]: Response to RAN2 LS on IAB Guard Symbols.

# Response to RAN2 LS on IAB Guard Symbols

**Source**: R1-2003252, R1-2003542, R1-2004126, R1-2004133, R1-2004280, R1-2004449, R1-2004582, R1-2004618

**Background:** During RAN2#109bis-e a LS was sent to RAN1 regarding the following RAN1 and RAN2 agreements:

RAN1#99 agreement:

Agreements:

*Desired Guard* Symbols and *Provided Guard Symbols* are provided per cell and use 3 bits for each of the 8 transitions to indicate the number of guard symbols.

* In Rel-16, a range of 0-4 symbols are supported for each transition. Additional entries are reserved for future use
* A new parameter *GuardSymbol-SCS* is also provided which indicates the reference SCS (FR1: {15kHz, 30kHz, 60kHz}, FR2: {60kHz, 120kHz}) to be used for the guard symbols.

RAN2#109-e agreement:

* RAN2 will design one single fixed-length Guard Symbols MAC CE, containing values (or indices mapped thereto) of all 8 parameters introduced by RAN1.

with the following action for RAN1:

RAN2 would very much appreciate it if RAN1 could inform RAN2 at their earliest convenience whether there is a requirement that Number of Guard Symbols should be applied to a specific cell, or if the Number of Guard Symbols applies across all the cells in the cell group.

**FL Observation:** During the preparation phase the following was proposal was made regarding the response to RAN2 about whether there is a requirement that Number of Guard Symbols should be applied to a specific cell, or if the Number of Guard Symbols applies across all the cells in the cell group:

**FL Proposal 2.1.2:**

**RAN1 should confirm one of the following alternatives and inform RAN2:**

**Alt. 1) The Number of Guard Symbols can be indicated for a specific MT cell and is applied across all transitions with paired DU cells within and IAB-node**

**Alt. 2) The Number of Guard Symbols can be indicated and applied for a specific (MT cell, DU cell) pair within an IAB-node**

**Additionally inform RAN2 of the following:**

**From a RAN1 perspective, the Guard Symbols MAC CE should support that [Alt 1. or Alt. 2.]. RAN1 also acknowledges that while in certain scenarios the Number of Guard Symbols could be the same for all the MT cells in the cell group, this condition is not a requirement.**

While Alt. 2 may be more aligned with the original RAN1 intention for the Guard Symbols, during the preparation phase Huawei raised the following concern: “even if the number of Guard Symbols is indicated for each (MT cell, DU cell) pair, the parent node can only apply the Guard symbols for one given MT cell at one time. The parent node does not know which DU cell the IAB node will switch from or to, it has to always assume the worst case among the (MT cell, DU cell) pairs.”

Given this ipotential issue with Alt. 2 and also the RAN2 agreement to indicate only a single set of the eight possible transition values, it appears that Alt. 1 is the most feasible option.

**Discussion:**

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| --- | --- | --- |
| **Company** | **Given the potential issues raised with Alt. 2, can Alt. 1 in Proposal 2.1.2 be agreed?** | **Comments** |
| Qualcomm | Yes | In response to the concern raised with alt 2, it should be noted that the parent node is aware of the child DU configurations, hence it could in principle determine if there is a MT🡨🡪DU transition involving one cell (e.g. one DU cell is marked NA while the other is marked H at the transition) or both cells at the same time (e.g. both DU cells are configured as H at the transition).  However, it is acknowledged this is probably a second order optimization, not required at the current stage of the WI, and hence, also considering the RAN2 implications of Alt 2, in this context Alt 1 is perfectly acceptable. |
| **ZTE, Sanechips** | **Neither is perfect. RAN1 does not seem to be asked by RAN2 the difference between Alt1 and Alt2.** | **The Alt-2 indeed has the issue as what Huawei commented in the preparation phase. However, Alt-1 may have different issue. RAN1 agreed following in #98bis and RAN1 #99:**  *Agreements****:***  *[RAN1 #98bis]The donor CU and the parent node can be made aware of the multiplexing capability between MT and DU (TDM required, TDM not required) of an IAB node to for any {MT CC, DU cell} pair.*   * *Signaling details up to RAN2/RAN3.*   *[RAN1 #99] The indication of the multiplexing capability for the case of no-TDM between IAB MT and IAB DU is additionally provided with respect to each transmission-direction combination (per MT CC/DU cell pair):*   * *MT-TX/DU-TX* * *MT-TX/DU-RX* * *MT-RX/DU-TX* * *MT-RX/DU-RX*   *Note: This agreement does not require any additional specification impact in RAN1 in Rel-16, i.e. in Rel-16 the behaviour of the IAB node is only defined for TDM cases. The behaviour for no-TDM is left to IAB-node/network implementation in Rel-16.*  **The Alt-1 actually, by saying “all transitions”, means that the guard symbol is still present in case the transition falls into “no-TDM capability” category. However, as RAN1 agreed, any behavior relating to “no-TDM” is not specified in Rel-16. People may also not want to sacrifice performance by inserting unnecessary guard symbols. But on the other hand, as commented by Huawei for Alt-2, the parent node would not know whether the child node chooses a “TDM capable” DU or “no-TDM capable” DU at a moment. This seems to need more RAN1 discussion which somehow touches the thing out of Rel-16 scope. It is our preference NOT to make any spec footprint or even RAN1 agreement upon this issue.**  **Meanwhile, the LS from RAN2 does not ask questions for DU-cell, but only asks questions for MT-cell (i.e., the guard symbol to be applied per single MT cell vs. all MT cells in a cell group). If RAN1 has the worry that the parent node may lack knowledge of child node behaviors relating to child DU cell, why should RAN1 include the relation with child DU-cell in the reply LS and propagate that uncertainty into RAN2?**  **Therefore, the reply LS in our preference could include the following only, without mentioning DU cell:**    *From a RAN1 perspective, the Number of Guard Symbols are indicated and applied for a specific MT cell. RAN1 also acknowledges that while in certain scenarios the Number of Guard Symbol for a given type of transition could be the same for all the MT cells in the cell group, this condition is not a requirement.* |
| **Nokia** | **Based on Alt.2.**    **The Number of Guard Symbols can be indicated and applied for a specific (MT cell)** | First, Alt.2 align with the Ran1 agreement.  Second, (MT cell, DU cell) pair was mentioned in many places as highlighted by ZTE. Our understanding is that “MT cell” refers to a serving cell configured for the MT by the parent DU, and the (MT cell, DU cell) pair may refer to a matching DU cell that uses the same frequency and time resources.  As this is more on using the same resources, the parent does not have to worry about which DU cell(s) overlaps with the serving cell configured for the IAB MT. What matters is the assumption of using the same resources, and TDM constraint shall be satisfied. For that, it is more than enough to indicate the guard symbols per MT cell. |
| **CMCC** | **Yes** | Alt 1 no doubt works, and it aligns with the original RAN1 agreements. |
| NTT DOCOMO | Yes | RAN1 may have the consensus that the answer to RAN2 question is “specific cell”, so we are also fine to answer this point only as ZTE mentioned. It seems that the discussion between Alt.1 and Alt.2 seems an implementation/behavior for a parent node, since a parent node can select the gap based on Alt.2 (specific MT-DU pair) or not, and it may indicate the gap for the all DUs (as in Alt.1) and the gap may be necessary for only specific DU (e.g. the DU resource is H). |
| Huawei | **Yes** | We are fine with proposed response to RAN2 from ZTE and Nokia.  From RAN1 point of view, we could check whether the following can be agreed   * ***Desired Guard Symbols* is provided for a specific (MT cell, DU cell) pair within an IAB-node** * ***Provided Guard Symbols* is provided for a specific MT cell** |
| Vivo | Yes | In our understanding, both alternative can works. Alt. 2 is the one which matches the original intention, however, we can accept a simple solution which does not scarify too much performance, i.e., Alt. 1-like |
| Samsung | **Yes** | We supports Alt.1 to address the concern. But, even if we go with “specific cell”, the same value for all MT cells can be applied by parent IAB implementation for some scenarios as commented by ZTE. So, we are also fine with ZTE’s suggestion. |
| LG | **Yes** | We are also fine with ZTE’s proposed response to RAN2 without mentioning “DU-cell”. |
| Ericsson | Yes | In our understanding, RAN2 asks whether Number of Guard Symbols should be applied to a specific MT cell, or if the Number of Guard Symbols applies across all the cells in the cell group an MT connects to. In this sense, we agree more with Alt. 1, though a reference to how Guard Symbols are eventually used or applied (by the IAB-node) is not really specified and does not need to be provided to RAN2.  We are fine with the proposed response to RAN2 from ZTE with the following initial sentence to better reflect the cell under consideration.  *From a RAN1 perspective, the Number of Guard Symbols are indicated and applied for a specific parent IAB-DU serving cell to which the MT is connected to.* |

# Summary

TBD