3GPP TSG RAN WG1 Meeting #100bis-e R1-20xxxxx

20th April– 30th April 2020

Agenda Item: 7.2.3.2

Source: Qualcomm Incorporated

Title: Summary of 7.2.3.2 - Extensions of RACH occasions and periodicities for backhaul RACH resources

Document for: Discussion and decision

### Introduction

This contribution provides a summary of the proposals for agenda item 7.2.3.2 on the subject of extensions of RACH occasions and periodicities for backhaul RACH resources for planning the email discussion in RAN1 #100bis-e.

### Issues for discussion

There is one contribution [1] on this agenda item which addresses some issues with the current specifications in TS 38.211.

The issues relate to inaccuracies in the following paragraph of TS 38.211:

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| For the IAB-MT part of an IAB node, the following applies:- if the higher-layer parameter *prach-ConfigurationPeriocScaling* is configured, the variable $x$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $ x\_{IAB}$ , where $ x\_{IAB}=δx$ and $δ$ is given by the higher-layer parameter *prach-ConfigurationPeriodScaling* and the IAB node does not expect $x\_{IAB}$ to be larger than 64;- if the higher-layer parameter *prach-ConfigurationFrameOffset* is configured, the variable $y$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $y\_{IAB}=\left(y+Δy\right) mod x$ where $Δy $ is given by the higher-layer parameter *prach-ConfigurationFrameOffset*, and $ x is the value used in n\_{SFN} mod x=y$;- if the higher-layer parameter *prach-ConfigurationSOffset* is configured, the subframe number in Tables 6.3.3.2-2 to 6.3.3.2-3 and the slot number in Table 6.3.3.2-4 shall be replaced by $\left(s\_{n}+Δs\right) mod L$ where $s\_{n}$ is the slot or subframe number, $Δs\in \left\{0,1,…,L-1\right\}$ is given by the higher-layer parameter *prach-ConfigurationSOffset*, and $L$ is the number of subframes in a frame in Tables 6.3.3.2-2 to 6.3.3.2-3 and the number of slots in a frame in Table 6.3.3.2-4. |

Specifically, the main issue is that the text “and $L$ is the number of subframes in a frame in Tables 6.3.3.2-2 to 6.3.3.2-3 and the number of slots in a frame in Table 6.3.3.2-4” seems to imply that L is provided in those tables. However, that interpretation would not be accurate and a reader not familiar with the IAB RAN1 context may get confused.

Moreover, a potential issue is that the text “the subframe number in Tables 6.3.3.2-2 to 6.3.3.2-3 and the slot number in Table 6.3.3.2-4 shall be replaced by (s\_n +Δs) mod L” may imply a value replacement in the tables while the previous two paragraphs describe a variable replacement in the equations using values from the tables.

A TP is proposed in [1] to address these issues.

A slightly simpler TP that minimizes the text changes is proposed:

**Proposal 1:**

**Adopt the following TP for section 6.3.3.2 of 38.211:**

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| **<**Unchanged text is omitted>For the IAB-MT part of an IAB node, the following applies:- if the higher-layer parameter *prach-ConfigurationPeriocScaling* is configured, the variable $x$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $ x\_{IAB}$ , where $ x\_{IAB}=δx$ and $δ$ is given by the higher-layer parameter *prach-ConfigurationPeriodScaling* and the IAB node does not expect $x\_{IAB}$ to be larger than 64;- if the higher-layer parameter *prach-ConfigurationFrameOffset* is configured, the variable $y$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $y\_{IAB}=\left(y+Δy\right) mod x$ where $Δy $ is given by the higher-layer parameter *prach-ConfigurationFrameOffset*, and $ x is the value used in n\_{SFN} mod x=y$;- if the higher-layer parameter *prach-ConfigurationSOffset* is configured, the subframe number $s\_{n}$ from ~~in~~ Tables 6.3.3.2-2 to 6.3.3.2-3 and the slot number $s\_{n}$ from ~~in~~ Table 6.3.3.2-4 shall be replaced by $\left(s\_{n}+Δs\right) mod L$ where$s\_{n}$ ~~is the slot or subframe number,~~ $Δs\in \left\{0,1,…,L-1\right\}$ is given by the higher-layer parameter *prach-ConfigurationSOffset*, and $L$ is the number of subframes in a frame when using ~~in~~ Tables 6.3.3.2-2 to 6.3.3.2-3 and the number of slots in a frame for SCS of 60 KHz when using ~~in~~ Table 6.3.3.2-4.**<**Unchanged text is omitted> |

Discussion on Proposal 1:

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| **Company** | **Support Proposal 1? [Yes/No]** | **Comments** |
| Qualcomm | Yes | None. |
| ZTE, Sanechips | Yes | None. |
| LG | Yes | None. |
| Ericsson | Yes | None |
| Nokia | Yes | None |
| Huawei | Yes | Regarding the proposed change, we would like to support Luca’s version with a slight update marked in blue this is already from the current spec.For the purpose of slot numbering in the tables, the following subcarrier spacing shall be assumed:-     15 kHz for FR1-     60 kHz for FR2.if the higher-layer parameter *prach-ConfigurationSOffset* is configured, the subframe number $s\_{n}$ from ~~in~~ Tables 6.3.3.2-2 to 6.3.3.2-3 and the slot number $s\_{n}$ from ~~in~~ Table 6.3.3.2-4 shall be replaced by $\left(s\_{n}+Δs\right) mod L$ where$s\_{n}$ ~~is the slot or subframe number,~~ $Δs\in \left\{0,1,…,L-1\right\}$ is given by the higher-layer parameter *prach-ConfigurationSOffset*,  and $L$ is the number of subframes in a frame when using ~~in~~ Tables 6.3.3.2-2 to 6.3.3.2-3 and the number of slots in a frame ~~for SCS of 60 KHz~~ when using ~~in~~ Table 6.3.3.2-4.Thanks for the further discussion. To me, the SCS for slot numbering is a general assumptions and should also be used to determine the number of slots within a frame. I don’t see why this assumption is not followed… Anyway, I will not object to repeating it again if everyone else feels differently. |
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### Conclusion

Based on the support from companies there is tentative agreement on the following:

**Tentative agreement 1:**

**Adopt the following TP for section 6.3.3.2 of 38.211:**

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| **<**Unchanged text is omitted>For the IAB-MT part of an IAB node, the following applies:- if the higher-layer parameter *prach-ConfigurationPeriocScaling* is configured, the variable $x$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $ x\_{IAB}$ , where $ x\_{IAB}=δx$ and $δ$ is given by the higher-layer parameter *prach-ConfigurationPeriodScaling* and the IAB node does not expect $x\_{IAB}$ to be larger than 64;- if the higher-layer parameter *prach-ConfigurationFrameOffset* is configured, the variable $y$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $y\_{IAB}=\left(y+Δy\right) mod x$ where $Δy $ is given by the higher-layer parameter *prach-ConfigurationFrameOffset*, and $ x is the value used in n\_{SFN} mod x=y$;- if the higher-layer parameter *prach-ConfigurationSOffset* is configured, the subframe number $s\_{n}$ from ~~in~~ Tables 6.3.3.2-2 to 6.3.3.2-3 and the slot number $s\_{n}$ from ~~in~~ Table 6.3.3.2-4 shall be replaced by $\left(s\_{n}+Δs\right) mod L$ where$s\_{n}$ ~~is the slot or subframe number,~~ $Δs\in \left\{0,1,…,L-1\right\}$ is given by the higher-layer parameter *prach-ConfigurationSOffset*, and $L$ is the number of subframes in a frame when using ~~in~~ Tables 6.3.3.2-2 to 6.3.3.2-3 and the number of slots in a frame for SCS of 60 KHz when using ~~in~~ Table 6.3.3.2-4.**<**Unchanged text is omitted> |

### References

[1] R1-2001874 – “Remaining issues in IAB PRACH” – ZTE, Sanechips

### Appendix

##### Proposals from contributions:

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| R1-2001874 | According to the discussion above, we provide the following proposal and text proposals on PRACH occasions of IAB node MT:6.3.3.2 Mapping to physical resources**<Unchanged text is omitted>**For the IAB-MT part of an IAB node, the following applies:- if the higher-layer parameter *prach-ConfigurationPeriocScaling* is configured, the variable $x$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $ x\_{IAB}$ , where $ x\_{IAB}=δx$ and $δ$ is given by the higher-layer parameter *prach-ConfigurationPeriodScaling* and the IAB node does not expect $x\_{IAB}$ to be larger than 64;- if the higher-layer parameter *prach-ConfigurationFrameOffset* is configured, the variable $y$ used in $n\_{SFN} mod x=y$ of Tables 6.3.3.2-2 to 6.3.3.2-4 shall be replaced by $y\_{IAB}=\left(y+Δy\right) mod x$ where $Δy$ is given by the higher-layer parameter *prach-ConfigurationFrameOffset*, and $x$ is the value used in $n\_{SFN} mod x=y$;- if the higher-layer parameter *prach-ConfigurationSOffset* is configured, the subframe number ~~in Tables 6.3.3.2-2 to 6.3.3.2-3~~ and the slot number ~~in Table 6.3.3.2-4~~ for PRACH time resources shall be replaced by $\left(s\_{n}+Δs\right) mod L$ where $s\_{n}$ ~~is the slot or subframe number,~~ $Δs\in \left\{0,1,…,L-1\right\}$ is given by the higher-layer parameter *prach-ConfigurationSOffset*, and $L$ ~~is the number of subframes in a frame in Tables 6.3.3.2-2 to 6.3.3.2-3 and the number of slots in a frame in Table 6.3.3.2-4.~~ - For subframe number determination, $s\_{n}$ is the subframe number in Tables 6.3.3.2-2 to 6.3.3.2-3 and L equals to 10.  - For slot number determination, $s\_{n}$ is the slot number in Tables 6.3.3.2-4 and L equals to 40. |