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

e-Meeting, 25th May – 5th June, 2020

Agenda Item: 6.1

Source: Ad-Hoc Chair (Ericsson)

Title: Summary of Email Discussion on PRACH Collision Handling for NB-IoT in RAN1#101-e

Document for: Discussion, Decision

# 1 Introduction

This document documents the inputs and the conclusions of the following email discussion assigned for RAN1#101-e.

[101-e-LTE-6.1CRs-01] Email discussion/approval of clarification on PRACH collision handling for NB-IoT (R1-2004006) by 5/28 – Havish (Ericsson)

# 2 Discussion

The inputs on R1-2004006 are captured in the table below.

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| Company | Comments |
| ZTE | From our understanding, the agreement on collision of NPRACH opportunities of different coverage levels in RAN1 #84bis meeting was based on subframe level. Current spec is aligned with the agreement. So, there is no need to change the spec or agreement. |
| Ericsson | NB-IoT was specified in Rel-13 according with Observation 1 (i.e., “collision is determined on subframe level”), which was clearly described in the specs. Therefore, we don’t see a need to change or confirm anything. |
| Huawei, HiSilicon | NPRACH to NPRACH collision handling is captured in RAN2 spec, while in RAN1 spec the UE just transmit the NPRACH subcarrier selected by MAC or other procedures.  In 36.321, the collision handling is captured in procedures that we should look at from procedure point of view: the first step, UE selects the preamble group; the second step, UE selects randomly the preamble (subcarrier); the third step, UE performs the collision handling that if for the selected NPRACH the subframe is occupied by higher EC NPRACH resources, it will not be used. Therefore, if the selected NPRACH doesn’t collide with any RE of the NPRACH resources of a higher EC, the selected NPRACH will be transmitted in that subframe.  *(copied from 36.321)*  5.1.2       Random Access Resource selection  The Random Access Resource selection procedure shall be performed as follows:                …  -     else the Random Access Preamble shall be selected by the MAC entity as follows:  …  -     For NB-IoT, select the PRACH resource corresponding to the selected enhanced coverage level, and select the Random Access Preambles group corresponding to the PRACH resource and the support for multi-tone Msg3 transmission. A UE supporting multi-tone Msg3 shall only select the single-tone Msg3 Random Access  …  -     randomly select a Random Access Preamble within the selected group. The random function shall be such that each of the allowed selections can be chosen with equal probability;  …  -     determine the next available subframe containing PRACH permitted by the restrictions given by the *prach-ConfigIndex* (except for NB-IoT)*,* the PRACH Mask Index (except for NB-IoT, see subclause 7.3), physical layer timing requirements [2] and in case of NB-IoT, the subframes occupied by PRACH resources related to a higher enhanced coverage level (a MAC entity may take into account the possible occurrence of measurement gaps when determining the next available PRACH subframe); |
| Mediatek | Huawei and Hi-silicon’s understanding from the procedure view makes sense, furthermore, we think if the network can’t avoid NPRACH resource collusion between different CE levels, the RE based collusion is beneficial to the make UE has more RACH opportunities i.e. lower and higher CE levels could coexist in same sub-frame.  we prefer to proposal 2. |
| Nokia, NSB | We share similar views as ZTE and Ericsson. We have clear understanding here (i.e. collision is determined on subframe level) and the specification is also clear in our view. Therefore, there is no need to change the spec or clarify RAN1 understanding. |
| Mediatek2 | Although there are 3 / 5 companies think that no change is needed for spec, the understanding of Huawei still makes sense.  We could imagine that in the future newcomers may think this issue as Huawei mentioned and encounter same confusion. For their convenience, we should do something to make it more clear.  The proposal 1 maybe is appropriate because the meaning of *NPRACH opportunities* isn’t unambiguous enough. Any other better suggestions are welcome. |

# 3 Conclusion

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# 4 References

[1] R1-2004006 Clarification on PRACH resource collision Handling for NB-IoT, Mediatek Inc.