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

**E-meeting, May 25 – June 5, 2020**

**Agenda Item: 6.2.2.4**

**Source: Moderator (Huawei)**

**Title: Feature lead summary on 101-e-LTE-NB\_IoTenh3-Coex-NR-01**

**Document for: Discussion and Decision**

# Introduction

This documents provides the proposals and summary of discussions of the following second phase email discussion for identified issues of NB-IoT co-existence with NR [5].

[101-e-LTE-NB\_IoTenh3-Coex-NR-01] DCI size misalignment by 5/29 – Yubo (Huawei)

* Issues #1 of [R1-2004704](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004704.zip)

# Discussion

Issue #1: DCI size misalignment

For resource reservation, [2] finds that the DCI N0 size will be one bit less than that of DCI N1 if only downlink reserved resource is configured and uplink reserved resource is not configured. So [2] proposes to append zeros to DCI N0 to align the size of N0 and N1 in the same search space. And [2] also proposes to correct the parameter names in RAN1 spec. One TP is proposed to correct it.

In [4], it is also observed that since the resource reservation and multi-TB scheduling are introduced in Rel-16, if these two features are configured separately for UL and DL, the DCI size of format N1 will be larger than that of format N0. One TP is proposed to correct it.

The corresponding TP proposed by [2] is below.

**-----------------------------------------------------Start of Text Proposal for 212-----------------------------------**

6.4.3.1 DCI Format N0

**Unchanged part is omitted**

- Resource reservation – 1 bit as defined in x.x of [3]. This field is only present if higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured and the CRC of the DCI is scrambled by C-RNTI (except during random access) or SPS C-RNTI.

If the number of information bits in format N0 in the UE specific search space given by the C-RNTI is less than that of format N1 in the same search space, zeros shall be appended to format N0 until the payload size equals that of format N1 in the same search space.

**------------------------------------------------------End of Text Proposal for 212------------------------------------**

The corresponding TP proposed by [4] is below.

TP to TS 36.212, section 6.4.3.2:

**<Unchanged parts are omitted>**

If the number of information bits in format N1 is less than that of format N0 and the format N1 CRC is not scrambled by G-RNTI, zeros shall be appended to format N1 until the payload size equals that of format N0. If the number of information bits in format N1 is larger than that of format N0 and the format N1 CRC is not scrambled by G-RNTI, zeros shall be appended to format N0 until the payload size equals that of format N1.

**<Unchanged parts are omitted>**

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| --- | --- |
| Companies | Comments |
| Ericsson | We prefer the TP from [2]. It seems most reasonable to add the new sentence in 6.4.3.1, where DCI format N0 is defined. The same approach is used for e.g. DCI formats 0 and 1. |
| ZTE | We think both TPs can work. If same approach as DCI format 0 is considered, adding the new sentence in 6.4.3.1 is better. |
| Huawei, HiSilicon | We prefer the first TP as it is for padding of DCI format 0 it’s better for reading and tracking to be put in subclause of DCI format 0. |
| ZTE’s further input | We propose the following modifications based on the first TP.   1. Change ‘given’ to ‘scrambled’ 2. Add the case of ‘SPS C-RNTI’ 3. Move ‘in the UE specific search space’ after ‘C-RNTI’ 4. Remove redundant ‘in the same search space’   If the number of information bits in format N0 scrambled by the C-RNTI or SPS C-RNTI in the UE specific search space is less than that of format N1 in the same search space, zeros shall be appended to format N0 until the payload size equals that of format N1. |
| Nokia, NSB | We prefer the first TP and are fine with ZTE’s modifications. |
| Qualcomm | We prefer to change the first TP to align with the wording used for “Resource reservation” for better reading and tracking, e.g. using CRC scrambled by C-RNTI (except during random access) or SPS C-RNTI instead of UE specific search space.  If the number of information bits in format N0 is less than that of format N1 and the format N0 CRC is scrambled by C-RNTI (except during random access) or SPS C-RNTI, zeros shall be appended to format N0 until the payload size equals that of format N1. |
| Ericsson 2 | Qualcomm’s proposal above seems to use the old wording that was changed in the previous meeting (see endorsed CR in [R1-2003154](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2003154.zip)). |
| Qualcomm2 | Our proposal is based on the following text from feature lead summary and seem it is not the latest version. Our purpose is to align the wording in the spec and thus we are okay to use the latest wording of “UE specific search space”.  Resource reservation – 1 bit as defined in x.x of [3]. This field is only present if higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured and the CRC of the DCI is scrambled by C-RNTI (except during random access) or SPS C-RNTI. |
| Huawei, HiSilicon 2 | From [2][4], the issue happens when resource reservation or multi-TB is configured for downlink, therefore, we should consider the field descriptions of multi-TB and resource reservation as below (copied from R1-2003154):  - Number of scheduled TB for Unicast – 1 bit, where value 0 indicates a single TB is scheduled and value 1 indicates multiple TB are scheduled. This field is only present if higher layer parameter *multi-TB-Unicast-config* is enabled and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3]. The field is set to 0 if the CRC of the DCI is scrambled by SPS C-RNTI.  …  - Resource reservation – 1 bit as defined in clause 16.5 of [3]. This field is only present if higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].  Then regarding ZTE and QC’s comments, it seems the change would be the following to be aligned with the wording in spec:  If the number of information bits in format N0 mapped onto the UE specific search space given by the C-RNTI as defined in [3] is less than that of format N1 in the same search space, zeros shall be appended to format N0 until the payload size equals that of format N1. |
| ZTE 3 | As we commented early, SPS C-RNTI should also be considered.  If the number of information bits in format N0 mapped onto the UE specific search space given by the C-RNTI or SPS C-RNTI as defined in [3] is less than that of format N1 in the same search space, zeros shall be appended to format N0 until the payload size equals that of format N1. |
| Ericsson 3 | It is enough to say “UE specific search space given by the C-RNTI” without mentioning SPS C-RNTI. At least that’s what we agreed in the previous meeting for other places where the same formulation is needed. If we write “C-RNTI or SPS C-RNTI” here then we need to change in all other places where a similar formulation is used for consistency. |
| Huawei, HiSilicon 3 | Regarding ZTE’s further comments above, the DCI with CRC scrambled by SPS C-RNTI is also mapped to the USS given by C-RNTI, as copied from 213 below:  **Table 16.5.1-5: NPDCCH and NPUSCH configured by SPS C-RNTI**   |  |  | | --- | --- | | **DCI format** | **Search Space** | | DCI format N0 | UE specific by C-RNTI | |

# Summary

# References

1. R1-1913595, “RAN1 agreements for Rel-16 Additional Enhancements for NB-IoT”, Futurewei, Reno, USA, November 2019.
2. R1-2003538 Corrections on coexistence of NB-IoT with NR, Huawei, HiSilicon
3. R1-2003798 Remaining issues on NB-IoT resource reservation, ZTE
4. R1-2003797, Remaining issues on scheduling enhancement for NB-IoT, ZTE
5. R1-2004704 Feature lead summary on coexistence of NB-IoT with NR, Moderator (Huawei), E-meeting, May 2020.