**3GPP TSG RAN WG1 Meeting #102-e R1-200xxxx**

**E-Meeting, August 17 – 28, 2020**

**Agenda Item: 6.2.2**

**Source: Moderator (Huawei)**

**Title: Text proposal on PUR-RNTI**

**Document for: Discussion and Decision**

# Introduction

This document provides the text proposal as outcomes of the following email discussion [1]:

[102-e-LTE-NB\_IoTenh3-03] NB-IoT alignment with higher layer parameters and terms

* Issue #6: misalignment of terms and higher layer parameters names
* Issue #7: misalignment of configuration of multiTB-Gap
* Issue#8: PUR RNTI
* Issue #9: several editorial (typos)
* Discussions/Agreement by 8/21, TPs by 8/28

# Discussion

## TP on PUR-RNTI

**Reason for changes:**

RAN1 and RAN2 specifications are not following a common terminology with respect to the PUR RNTI. RAN1 specifications are using “PUR C-RNTI” while RAN2 specifications are using “PUR-RNTI” (e.g. see TS 36.302).

**Summary of changes:**

PUR C-RNTI is corrected to be PUR-RNTI to be aligned with RAN2 specifications.

**Specs/sections impacted:**

**Consequences if not approved:**

There may be ambiguity when referring to the PUR-RNTI.

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6.4.3.1 DCI Format N0

DCI format N0 is used for the scheduling of NPUSCH and operation on preconfigured UL resources in one UL cell.

The following information is transmitted by means of the DCI format N0:

- Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1

- Modulation and coding scheme – 4 bits as defined in clause 16.5.1.2 of [3]. This field is only present if format N0 CRC is scrambled by PUR-RNTI.

If format N0 CRC is scrambled by PUR-RNTI and Modulation and coding scheme is set to '1110', the remaining fields are set as follows:

- ACK or Fallback indicator – 1 bit, where value 0 indicates ACK and value 1 indicates fallback as defined in clause 16.6.4 of [3]

- NPUSCH repetition adjustment – 3 bits as defined in clause 16.5.1.1 of [3]

- Timing advance adjustment – 6 bits as defined in clause 16.1.2 of [3]. The field is only present if ACK or Fallback indicator is set to 0.

- All the remaining bits in format N0 are set to one

Otherwise

- Subcarrier indication – 6 bits as defined in clause 16.5.1.1 of [3]

- Resource assignment – 3 bits as defined in clause 16.5.1.1 of [3]

- Scheduling delay – 2 bits as defined in clause 16.5.1 of [3]

- Modulation and coding scheme – 4 bits as defined in clause 16.5.1.2 of [3]. This field is not present if format N0 CRC is scrambled by PUR-RNTI.

- Redundancy version – 1 bit as defined in clause 16.5.1.2 of [3]

- Repetition number – 3 bits as defined in clause 16.5.1.1 of [3]

- New data indicator – 1 bit

- DCI subframe repetition number – 2 bits as defined in clause 16.6 in [3]

- 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 *npusch-MultiTB-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.

- HARQ process number – 1 bit. This field is only present if 2 HARQ processes are configured and the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3], or if Number of scheduled TB for Unicast is present. If multiple TB are scheduled, it functions as New data indicator for the second TB.

- 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].

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.

6.4.3.2 DCI Format N1

DCI format N1 is used for the scheduling of one NPDSCH codeword per TTI in one cell, random access procedure initiated by a NPDCCH order, notifying SC-MCCH change, and operation on preconfigured UL resources. The DCI corresponding to a NPDCCH order is carried by NPDCCH.

The following information is transmitted by means of the DCI format N1:

- If the format N1 CRC is scrambled by C-RNTI or RA-RNTI or PUR-RNTI:

- Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1

- NPDCCH order indicator – 1 bit

- Else if the format N1 CRC is scrambled by a G-RNTI:

- Information for SC-MCCH change notification – 2 bits as defined in clause 5.8a of [6]

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----------------------------------------------- Start of Text Proposal to 36.213 -----------------------------

### 16.4.1 UE procedure for receiving the narrowband physical downlink shared channel

<Unchanged parts omitted>

If a UE is configured by higher layers to decode NPDCCH with CRC scrambled by the PUR-RNTI, the UE shall decode the NPDCCH and the corresponding NPDSCH according to any of the combination defined in Table 16.4.1-9. The scrambling initialization of the NPDSCH corresponding to these NPDCCHs is by PUR-RNTI.

Table 16.4.1-9: NPDCCH and NPDSCH configured by PUR-RNTI

|  |  |
| --- | --- |
| DCI format | Search Space |
| DCI format N1 | UE specific by PUR-RNTI |

<Unchanged parts omitted>

### 16.5.1 UE procedure for transmitting format 1 narrowband physical uplink shared channel

<Unchanged parts omitted>

A UE may transmit NPUSCH on preconfigured uplink resources as configured by higher layers. The scrambling initialization of NPUSCH transmission using preconfigured uplink resource is by PUR-RNTI.

If a UE is configured by higher layers to decode NPDCCHs with the CRC scrambled by the PUR-RNTI, the UE shall decode the NPDCCH according to the combination defined in Table 16.5.1-6 and in case the indication in the DCI corresponds to the retransmission of a transport block transmitted using preconfigured uplink resource, transmit a corresponding NPUSCH. The scrambling initialization of this NPUSCH corresponding to these NPDCCHs and the NPUSCH retransmission for the same transport block is by PUR-RNTI.

Table 16.5.1-6: NPDCCH and NPUSCH configured by PUR-RNTI

|  |  |
| --- | --- |
| DCI format | Search Space |
| DCI format N0 | UE specific by PUR-RNTI |

#### 16.5.1.1 Resource allocation

The resource allocation information in uplink DCI format N0 for NPUSCH transmission or configured by higher layers for NPUSCH transmission using preconfigured uplink resource indicates to a scheduled UE

* a set of contiguously allocated subcarriers () of a resource unit determined by the Subcarrier indication field,
* a number of resource units () determined by the resource assignment field according to Table 16.5.1.1-2,
* a repetition number () determined by the repetition number field according to Table 16.5.1.1-3. For a NPUSCH transmission using preconfigured uplink resource, the UE shall use the repetition number determined by the NPUSCH repetition adjustment field according to Table 16.5.1.1-3 from the most recent NPDCCH DCI format N0 with CRC scrambled by PUR-RNTI with the value of "modulation and coding scheme" field () set to '14' if detected, configured by higher layers otherwise.

<Unchanged parts omitted>

## 16.6 Narrowband physical downlink control channel related procedures

<Unchanged parts omitted>

For NPDCCH UE-specific search space, the aggregation and repetition levels defining the search spaces and the corresponding NPDCCH candidates are listed in Table 16.6-1 by substituting the value of with the higher layer configured parameter *npdcch-NumRepetitions*, except for NPDCCH candidates associated with PUR-RNTI in which case it is given by higher layer parameter *npdcch-NumRepetition­s* in *PUR-Config-NB*.

<Unchanged parts omitted>

- for NPDCCH UE-specific search space,

- is given by the higher layer parameter *npdcch-StartSF-USS*, except for NPDCCH candidates associated with PUR-RNTI in which case it is given by higher layer parameter *npdcch-StartSF-USS* in *PUR-Config-NB*,

- is given by the higher layer parameter *npdcch-Offset-USS*, except for NPDCCH candidates associated with PUR-RNTI in which case it is given by higher layer parameter *npdcch-Offset-USS* in *PUR-Config-NB*,

<Unchanged parts omitted>

If the UE has initiated a NPUSCH transmission using preconfigured uplink resource ending in subframe *n*, the UE shall monitor the NPDCCH UE-specific search space in a search space window starting in subframe *n+4* with duration given by higher layer parameter *pur-SS-window-duration*. Upon detection of a NPDCCH with DCI format N0 with CRC scrambled by PUR-RNTI intended for the UE within the search space window and the value of "modulation and coding scheme" field () in the corresponding DCI is set to '14', the UE is not required to monitor the NPDCCH UE-specific search space for the remaining search space window duration.

----------------------------------------------- End of Text Proposal to 36.213 ------------------------------

# References

1. R1-2007270 Feature summary on [102-e-LTE-NB\_IoTenh3-03] Moderator (Huawei)