**3GPP TSG RAN WG1 Meeting #100bis-e R1-200xxxx**

**E-Meeting, April 20 – 30, 2020**

**Agenda Item: 6.2.2.4**

**Source: Huawei**

**Title: TP on SPS and fully reserved subframe**

**Document for: Discussion and Decision**

# Introduction

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

[100b-e-LTE-NB\_IoTenh3-Coex-NR-03] Clarification for SPS and fully reserved subframe (Editorial) – Yubo (Huawei)

* Issues #5, #6 in R1-2002700

# Discussion

**Reason for changes:**

With the sentence “associated with C-RNTI or SPS C-RNTI using UE-specific NPDCCH search space”, the SPS NPUSCH is not considered as it’s not using UE-specific NPDCCH search space.

There is no clear definition for fully reserved subframe.

**Summary of changes:**

The sentence “associated with C-RNTI or SPS C-RNTI using UE-specific NPDCCH search space” is changed to “associated with SPS C-RNTI or with C-RNTI using UE-specific NPDCCH search space”.

The definition for fully reserved subframe is added.

**Specs/sections impacted:**

Sections of 36.211: 10.1.3.6, 10.1.4.2, 10.2.3,4, 10.2.5.5,

Sections of 36.213: 16.4, 16.5

**Consequences if not approved:**

The SPS NPUSCH may not be considered for resource reservation.

There may be ambiguity on the fully reserved subframe.

===============================Start of text proposal to TS 36.211====================

10.1.3.6 Mapping to physical resources

<unchanged parts are omitted>

If higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured, then in case of NPUSCH format 1 transmission associated with SPS C-RNTI or with C-RNTI using UE-specific NPDCCH search space with the Resource reservation field in the DCI set to 1, or in case of NPUSCH format 2 transmission associated with C-RNTI using UE-specific NPDCCH search space,

- In a subframe that is fully reserved as defined in clause 16.5 in [4],

- for , the NPUSCH transmission is postponed until the next NB-IoT uplink subframe that is not fully reserved.

- for , the NPUSCH transmission in the slot is postponed until the next slot spanning over two contiguous uplink subframes not overlapping with any uplink subframe that is fully reserved.

- In a subframe that is partially reserved, the SC-FDMA symbols overlapping with reserved symbols shall be counted in the NPUSCH mapping but not used for transmission of the NPUSCH.

<unchanged parts are omitted>

10.1.4.2 Mapping to physical resources

The sequence  shall be multiplied with the amplitude scaling factor  and mapped in sequence starting with  to the sub-carriers.
The set of sub-carriers used in the mapping process shall be identical to the corresponding NPUSCH transmission as defined in clause 10.1.3.6.
The mapping to resource elements  shall be in increasing order of first, then , and finally the slot number. The values of the symbol index  in a slot are given in Table 10.1.4.2-1.

**Table 10.1.4.2-1: Demodulation reference signal location for NPUSCH.**

|  |  |
| --- | --- |
| **NPUSCH format** | **Values for**  |
|  |  |
| 1 | 4 | 3 |
| 2 | 0,1,2 | 2,3,4 |

If higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured, then in case of NPUSCH transmission format 1 associated with SPS C-RNTI or with C-RNTI using UE-specific NPDCCH search space and the Resource reservation field in the DCI is set to 1, or in case of NPUSCH format 2 transmission associated with C-RNTI using UE-specific NPDCCH search space,

- In a slot that is fully reserved, the demodulation reference signal transmission is dropped (a slot is considered fully reserved if and only if all SC-FDMA symbols are reserved in the slot).

- In a SC-FDMA symbol that is reserved, the demodulation reference signal transmission is dropped.

<unchanged parts are omitted>

10.2.3.4 Mapping to resource elements

<unchanged parts are omitted>

If higher layer parameter *valid-subframe-config-DL* or *slot-reserved-resource-config-DL* is configured, then in case of NPDSCH transmission associated with C-RNTI using UE-specific NPDCCH search space with the Resource reservation field in the DCI set to 1,

* - In a subframe that is fully reserved as defined in clause 16.4 in [4], the NPDSCH transmission is postponed until the next NB-IoT downlink subframe that is not fully reserved.
* - In a subframe that is partially reserved, the reserved OFDM symbols shall be counted in the NPDSCH mapping but not used for transmission of the NPDSCH.

<unchanged parts are omitted>

10.2.5.5 Mapping to resource elements

<unchanged parts are omitted>

If higher layer parameter *valid-subframe-config-DL* or *slot-reserved-resource-config-DL* is configured, then in case of NPDCCH transmission associated with SPS C-RNTI or with C-RNTI using UE-specific NPDCCH search space,

- In a subframe that is fully reserved as defined in clause 16.4 in [4], the NPDCCH transmission is postponed until the next NB-IoT downlink subframe that is not fully reserved.

- In a subframe that is partially reserved, the reserved OFDM symbols shall be counted in the NPDCCH mapping but not used for transmission of the NPDCCH.

===============================End of text proposal to TS 36.211====================

===============================Start of text proposal to TS 36.213====================

16.4 Narrowband physical downlink shared channel related procedures

A NB-IoT UE shall determine whether a downlink subframe or a TDD special subframe configured for NB-IoT DL transmission is a NB-IoT DL subframe as follows

- If higher layer parameter *valid-subframe-config-DL* or *slot-reserved-resource-config-DL* is configured

- for NPDSCH transmission associated with C-RNTI using UE-specific NPDCCH search space

- if the Resource reservation field in the DCI is set to 0, then the subframe is assumed as a NB-IoT DL subframe

- if the Resource reservation field in the DCI is set to 1, then the subframe is assumed as a NB-IoT DL subframe if it is not fully reserved according to the higher layer parameters (a subframe is considered fully reserved if and only if all OFDM symbols are reserved in the subframe).

- for NPDCCH transmission associated with SPS C-RNTI or with C-RNTI using UE-specific NPDCCH search space

- the subframe is assumed as a NB-IoT DL subframe if it is not fully reserved according to the higher layer parameters (a subframe is considered fully reserved if and only if all OFDM symbols are reserved in the subframe).

- In all other cases, a NB-IoT UE shall assume a subframe as a NB-IoT DL subframe if

- the UE determines that the subframe does not contain NPSS/NSSS/NPBCH/ *SystemInformationBlockType1-NB* transmission, and

- for a NB-IoT carrier that a UE receives higher layer parameter *operationModeInfo,* the subframe is configured as NB-IoT DL subframe or the subframe is a TDD special subframe configured for NB-IoT DL transmission after the UE has obtained *SystemInformationBlockType1-NB*.

- the subframe is configured as NB-IoT DL subframe by the higher layer parameter *downlinkBitmapNonAnchor*.

- except when the UE is configured with higher layer parameter *additionalTxSIB1-Config* set to *TRUE*, subframe #3 not containing additional *SystemInformationBlockType1-NB* transmission is assumed as a NB-IoT DL subframe if the UE monitors a NPDCCH UE-specific search space or decodes NPDSCH transmission scheduled by NPDCCH in the UE-specific search space.

<unchanged parts are omitted>

16.5 Narrowband physical uplink shared channel related procedures

For a NB-IoT UE that supports *twoHARQ-Processes-r14* or the UE is configured with higher layer parameter *multi-TB-Unicast-config*, there shall be a maximum of 2 uplink HARQ processes.

For a NB-IoT UE and NPUSCH transmission using preconfigured uplink resource, there shall be 1 uplink HARQ process.

A NB-IoT UE shall determine whether a subframe is a NB-IoT UL subframe as follows

- If higher layer parameter *valid-subframe-config-UL* or *slot-reserved-resource-config-UL* is configured

- for NPUSCH format 1 transmission associated with SPS C-RNTI or with C-RNTI using UE-specific NPDCCH search space

- if the Resource reservation field in the DCI is set to 0, then the subframe is assumed as a NB-IoT UL subframe

- if the Resource reservation field in the DCI is set to 1, then the subframe is assumed as a NB-IoT UL subframe if it is not fully reserved according to the higher layer parameters (a subframe is considered fully reserved if and only if all SC-FDMA symbols are reserved in the subframe).

- for NPUSCH format 2 transmission

- the subframe is assumed as a NB-IoT UL subframe if it is not fully reserved according to the higher layer parameters (a subframe is considered fully reserved if and only if all SC-FDMA symbols are reserved in the subframe).

- In all other cases,

- for TDD, a NB-IoT UE shall assume a subframe as a NB-IoT UL subframe if, for a NB-IoT carrier, it is configured as NB-IoT UL subframe by higher layers

- for FDD, a NB-IoT UE shall always assume a subframe as a NB-IoT UL subframe.

===============================End of text proposal to TS 36.213====================

# Summary

# References

1. R1-200xxxx Feature lead summary #1 on 100b-e-LTE-NB\_IoTenh3-Coex-NR-03 Moderator(Huawei)