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

**e-Meeting, April 20th – 30th, 2020**

**Agenda Item: 7.2.2.2.3**

**Source: Moderator (Huawei)**

**Title: TP for NR-U HARQ issue A11 (SPS)**

**Document for: Discussion and Decision**

# Introduction

This document provides TP proposals on issue A11 based on proposal 1 and 2 in [2]. It is proposed to handle the TP corresponding to “DCI format 1\_1 should not simultaneously indicate a NNK1 value and request feedback of Type-3 HARQ-ACK codebook (one-shot HARQ-ACK request field with value 1)” with the TP for issue B10 in email discussion [100b-e-NR-unlic-NRU-HARQ-01].

[100b-e-NR-unlic-NRU-HARQ-03] Email discussion/approval on handling of SPS with enhanced dynamic codebook and with NNK1 by 4/24; if necessary, followed by endorsing the corresponding TPs by 4/30 – David (Huawei)

# TPs

**TP#1 (TS 38.213 v16.1.0)**

Reason for change: Clarify how HARQ-ACK information for SPS PDSCH is reported in a Type-2 HARQ-ACK codebook when the UE is provided pdsch-HARQ-ACK-Codebook = enhancedDynamic-r16.

================== Beginning of text proposal ===================

**9.1.3.3 Type-2 HARQ-ACK codebook grouping and HARQ-ACK retransmission**

If a UE is provided pdsch-HARQ-ACK-Codebook = enhancedDynamic-r16, the UE determines HARQ-ACK information for multiplexing in a PUCCH transmission occasion according to the following procedure.

\*\*\* Unchanged text is omitted \*\*\*

Generate first HARQ-ACK information for PUCCH transmission occasion $i(g)$ in a slot, as described in Clause 9.1.3.1, where

- the first HARQ-ACK information corresponds only to detections of DCI formats each providing a same value of $g$, of $h(g)$, if any, and at least one of the DCI formats providing a value of $k$ indicating the slot

- at least one of the DCI formats provides a $h(g)$ value

- $m=0$ corresponds to a PDCCH monitoring occasion, where the UE detects a DCI format that provides a value of $g$, that is the first PDCCH monitoring occasion after a PDCCH monitoring occasion where the UE detects another DCI format that provides a value different than $h(g)$

The generation of the first HARQ-ACK information for PUCCH transmission occasion $i\left(g\right)$ in a slot, as described in Clause 9.1.3.1, includes the generation of HARQ-ACK information for DL SPS PDSCH.

If $h^{\left(g+1\right)mod2}\left(g\right)=∅$ or $h^{\left(g+1\right)mod2}\left(g\right)=h(\left(g+1\right)mod2)$, generate second HARQ-ACK information for PUCCH transmission occasion $i(\left(g+1\right)mod2)$ in a slot, as described in Clause 9.1.3.1, where

- the second HARQ-ACK information corresponds to detections of DCI formats each providing a same value of $\left(g+1\right)mod2$, of $h(\left(g+1\right)mod2)$, if any

- at least one of the DCI formats provides a $h(\left(g+1\right)mod2)$ value

- $m=0$ corresponds to a PDCCH monitoring occasion, where the UE detects a DCI format that provides a value of $\left(g+1\right)mod2$, that is the first PDCCH monitoring occasion after a PDCCH monitoring occasion where the UE detects another DCI format that provides a value different than $h(\left(g+1\right)mod2)$

- the PUCCH transmission occasion $i(\left(g+1\right)mod2)$ is a last one for multiplexing second HARQ-ACK information and it is not after PUCCH transmission occasion $i(g)$

- if $V\_{DAI}^{\left(g+1\right)mod2}\ne ∅$, after the completion of the $c$ and $m$ loops for the pseudo-code for the second HARQ-ACK codebook generation in Clause 9.1.3.1, set $V\_{temp2}=V\_{DAI}^{\left(g+1\right)mod2}$ for both sub-codebooks, if any.

If $h^{\left(g+1\right)mod2}\left(g\right)\ne ∅$ and $h^{\left(g+1\right)mod2}\left(g\right)\ne h(\left(g+1\right)mod2)$, generate second HARQ-ACK information, as described in Clause 9.1.3.1, by setting $V\_{C-DAI,c,m}^{DL}=0$ for all $c$ and all $m$ and, after the completion of the $c$ and $m$ loops for the pseudo-code for the second HARQ-ACK codebook generation in Clause 9.1.3.1, setting $V\_{temp2}=V\_{DAI}^{\left(g+1\right)mod2}$.

The generation of the second HARQ-ACK information for PUCCH transmission occasion $i(\left(g+1\right)mod2)$ in a slot, as described in Clause 9.1.3.1, excludes the generation of HARQ-ACK information for DL SPS PDSCH.

\*\*\* Unchanged text is omitted \*\*\*

================== End of text proposal ===================

**TP#2 (TS 38.213 v16.1.0)**

Reason for change: Clarify the UE behavior if DCI format 1\_1 simultaneously indicates a NNK1 value and activates a SPS configuration (CRC scrambled with CS-RNTI and NDI=0). Clarify the UE behavior if DCI format 1\_1 simultaneously indicates a NNK1 value and requests feedback of Type-3 HARQ-ACK codebook (one-shot HARQ-ACK request field with value 1).

================== Beginning of text proposal ===================

**10.2 PDCCH validation for DL SPS and UL grant Type 2**

A UE validates, for scheduling activation or scheduling release, a DL SPS assignment PDCCH or configured UL grant Type 2 PDCCH if

- the CRC of a corresponding DCI format is scrambled with a CS-RNTI provided by *cs-RNTI*, and

- the new data indicator field in the DCI format for the enabled transport block is set to '0', and

- the DFI flag field, if present, in the DCI format is set to '0'.

- the PDSCH-to-HARQ\_feedback timing indicator field does not provide an inapplicable value from *dl-DataToUL-ACK*

\*\*\* Unchanged text is omitted \*\*\*

================== End of text proposal ===================

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| **Company** | **Comments** |
| OPPO | TP#1 does not seem to capture the following agreement Agreement:The HARQ-ACK bit(s) corresponding to SPS PDSCH is(are) appended to the end of a dynamic HARQ-ACK codebook with PDSCH grouping, without belonging to any group. |

# References

1. R1-2002696 Feature lead summary#1 on NR-U HARQ, RAN1#100b-e
2. R1-2002924 Feature lead summary#1 on email discussion 100b-e-NR-unlic-NRU-HARQ-03 (SPS)