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

e-Meeting, May 25th – June 5th, 2020

Agenda Item: 7.2.4.2.1

Source: Ericsson (Moderator)

Title: TPs for 38.212 and 38.213 for the agreements in [101-e- NR-5G\_V2X\_NRSL-Mode-1-03]

Document for: Discussion, Decision

# 1 Introduction

This contribution includes text proposals for 38.212 and 38.213 to implement the SL HARQ-ACK reporting to the gNB in PUSCH, including the following agreements from [101-e- NR-5G\_V2X\_NRSL-Mode-1-03]

**Conclusion:**

* In preparing the TP for SL HARQ-ACK reporting in PUSCH using type-1 codebook, at least the following changes are made with respect to the Rel-15 specification:
	+ “PSFCH-to-HARQ\_feedback timing indicator” replaces “PDSCH-to-HARQ\_feedback timing indicator”
		- sl-PSFCH-ToPUCCH is used to determine PSFCH-to-PUCCH gap for SL CG type-1
	+ *sl-DataToUL-ACK* replaces *dl-DataToUL-ACK*.
	+ DCI format 3\_0 is used instead of formats 1\_0 and 1\_1.
	+ SL configured grant replaces SPS PDSCH
	+ Counter SAI replaces counter DAI
	+ “Subclause 9.1.2” is changed to “Subclause 16.5.1”
	+ “Subclause 9.1.2.1” is changed to “Subclause 16.5.1.1”
	+ *MA* replaces *MC*
* NOTE: This is not intended to change the reporting of DL HARQ-ACK in any way.

Agreement:

* If the UL is configured with SL-RNTI or SL-CS-RNTI, and is configured to monitor DCI format 0\_1, and *pdsch-HARQ-ACK-Codebook = semi-static*:
	+ DCI format 0\_1 includes a SAI field with 1 bits.
	+ The use of this field is the same as the use of VULT-DAI in TS 38.213 Subclause 9.1.2.2 (Rel-15 procedures).

**Conclusion**

* In preparing the TP for SL HARQ-ACK reporting in PUSCH using type-1 codebook:
	+ The following parameters and the corresponding parts of the Rel-15 specification are not used:
		- Parameters related to transmission of more than 1 TB:
			* *harq-ACK-SpatialBundlingPUSCH*
	+ The following functionality from the Rel-15 specification is not supported:
		- HARQ-ACK for SPS PDSCH release

NOTE: This is not intended to change the reporting of DL HARQ-ACK in any way.

**Conclusion:**

* In preparing the TP for SL HARQ-ACK reporting in PUSCH using type-2 codebook, at least the following changes are made with respect to the Rel-15 specification:
	+ DCI format 3\_0 is used instead of formats 1\_0 and 1\_1.
	+ SL configured grant replaces SPS PDSCH
	+ “Subclause 9.1.3.1” is changed to “Subclause 16.5.2.1”

NOTE: This is not intended to change the reporting of DL HARQ-ACK in any way.

Agreement:

* If the UL is configured with SL-RNTI or SL-CS-RNTI, and is configured to monitor DCI format 0\_1, and pdsch-HARQ-ACK-Codebook = *dynamic*:
	+ DCI format 0\_1 includes a SAI field with 2 bits.
	+ Vtemp = V^UL\_SAI is set after the m loop, like in the Rel-15 procedures in TS 38.213 Subclause 9.1.3.2.

**Conclusion:**

* In preparing the TP for SL HARQ-ACK reporting in PUSCH using type-2 codebook:
	+ The following parameters and the corresponding parts of the Rel-15 specification are not used:
		- Parameters related to transmission of more than 1 TB:
			* *harq-ACK-SpatialBundlingPUSCH*
		- Parameters related to CBG transmission:
			* *PDSCH-CodeBlockGroupTransmission*
	+ The following functionality from the Rel-15 specification is not supported:
		- HARQ-ACK for SPS PDSCH release
		- Sub codebooks

NOTE: This is not intended to change the reporting of DL HARQ-ACK in any way.

Agreement:

* For SL HARQ-ACK reporting to the gNB, the value of βoffset and the scaling α used for rate matching configured for DL HARQ-ACK reporting in PUSCH are used.

# 2 TP for 38.212

##### 7.3.1.1.2 Format 0\_1

**<Unchanged parts are omitted>**

Otherwise, all the remaining fields are set as follows:

**<Unchanged parts are omitted>**

- SCell dormancy indication – 0 bit if higher layer parameter *Scell-groups-for-dormancy-within-active-time* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to higher layer parameter *Scell-groups-for-dormancy-within-active-time,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *Scell-groups-for-dormancy-within-active-time,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.

- sidelink assignment index – 0, 1 or 2 bits:

- 1 bit if the UE is configured with *pdsch-HARQ-ACK-Codebook* = *semi-static* and with SL-RNTI or SL-CS-RNTI;

- 2 bits if the UE is configured with *pdsch-HARQ-ACK-Codebook* = *dynamic* and with SL-RNTI or SL-CS-RNTI;

- 0 bit otherwise.

A UE does not expect that the bit width of a field in DCI format 0\_1 with CRC scrambled by CS-RNTI is larger than corresponding bit width of same field in DCI format 0\_1 with CRC scrambled by C-RNTI for the same serving cell. If the bit width of a field in the DCI format 0\_1 with CRC scrambled by CS-RNTI is not equal to that of the corresponding field in the DCI format 0\_1 with CRC scrambled by C-RNTI for the same serving cell, a number of most significant bits with value set to '0' are inserted to the field in DCI format 0\_1 with CRC scrambled by CS-RNTI until the bit width equals that of the corresponding field in the DCI format 0\_1 with CRC scrambled by C-RNTI for the same serving cell.

**<Unchanged parts are omitted>**

# 3 TP for TS 38.213 (HARQ-ACK codebook generation)

Notes:

* Section 16.5.1 incorporates changes with respect to the endorsed CR in [1].
* Sections 16.5.1.2 and 16.5.2.2 incorporate track changes with respect to sections 9.1.2.2 and 9.1.3.2 in TS 38.213 v15.9.0, respectively. These track changes are for guidance during the discussion. They will be removed in the final version, as these are new sections in the specification.

## 16.5 UE procedure for reporting HARQ-ACK on uplink

**<Unchanged parts are omitted>**

### 16.5.1 Type-1 HARQ-ACK codebook determination

**<Unchanged parts are omitted>**

If a UE reports HARQ-ACK information in a PUCCH only for

- PSFCH reception occasions associated with PSSCH transmissions scheduled by a DCI format 3\_0 with counter SAI field value of 1, or

- PSFCH reception occasions associated with PSSCH transmissions corresponding to a SL configured grant

within the occasions for candidate PSSCH transmissions with corresponding PSFCH reception occasions as determined in Clause 16.5.1.1, the UE determines a HARQ-ACK codebook only for the PSFCH reception occasion associated with PSSCH transmission scheduled by DCI format 3\_0 or only for the PSFCH reception occasion associated with PSSCH transmission corresponding to a SL configured grant according to corresponding occasions, where a value of a counter SAI in DCI format 3\_0 is according to Table 16.5.2.1-1. Otherwise, the procedures in Clause 16.5.1.1 and in Clause 16.5.1.2 for a HARQ-ACK codebook determination apply.

#### 16.5.1.1 Type-1 HARQ-ACK codebook in physical uplink control channel

**<Unchanged parts are omitted>**

#### 16.5.1.2 Type-1 HARQ-ACK codebook in physical uplink shared channel

If a UE would multiplex HARQ-ACK information in a PUSCH transmission that is not scheduled by a DCI format or is scheduled by DCI format 0\_0, then

- if the UE has not received any PDCCH with a DCI format 3\_0 scheduling PSSCH transmissions with corresponding PSFCH reception occasions that the UE transmits corresponding HARQ-ACK information in the PUSCH, based on a value of a respective PSFCH-to-HARQ\_feedback timing indicator field in a DCI format scheduling the PSSCH transmission or on the value of PSFCH-to-HARQ feedback timing indicator field in a DCI format 3\_0 activating a SL configured grant Type-2 transmission or on the value of *sl-PSFCH-ToPUCCH* for a SL configured grant Type-1, in any of the occasions for candidate PSSCH transmissions with corresponding PSFCH reception occasions, as described in Subclause 16.5.1.1, the UE does not multiplex HARQ-ACK information in the PUSCH transmission;

- else the UE generates the HARQ-ACK codebook as described in Subclause 16.5.1.1, unless the UE generates HARQ-ACK information only for PSFCH receptions associated with PSSCH transmissions corresponding to a SL configured grant, or only for PSFCH reception occasions associated with PSSCH transmissions that are scheduled by DCI format 3\_0 with a counter SAI field value of 1 in the occasions for candidate PSSCH transmissions with corresponding PSFCH reception occasions in which case the UE generates HARQ-ACK information only for the PSFCH reception occasions as described in Subclause 16.5.1.

A UE sets to NACK value in the HARQ-ACK codebook any HARQ-ACK information corresponding to PSFCH reception occasions associated with PSSCH transmissions scheduled by DCI format 3\_0 that the UE detects in a PDCCH monitoring occasion that starts after a PDCCH monitoring occasion where the UE detects a DCI format 0\_0 or a DCI format 0\_1 scheduling the PUSCH transmission.

A UE does not expect to detect a DCI format switching a DL BWP within  symbols prior to a first symbol of a PUSCH transmission where the UE multiplexes HARQ-ACK information, where  is defined in [6, TS 38.214].

If a UE multiplexes HARQ-ACK information in a PUSCH transmission that is scheduled by DCI format 0\_1, the UE generates the HARQ-ACK codebook as described in Subclause 16.5.1.1 when a value of the DAI field in DCI format 0\_1 is . The UE does not generate a HARQ-ACK codebook for multiplexing in the PUSCH transmission when unless the UE generates HARQ-ACK information only for PSFCH reception occasions associated with PSSCH transmissions corresponding to a SL configured grant, or only for PSFCH reception occasions associated with PSSCH transmissions that are scheduled by DCI format 3\_0 with a counter DAI field value of 1 in the occasions for candidate PSSCH transmission with corresponding PSFCH reception occasions as described in Subclause 16.5.1. if the SAI field in DCI format 0\_1 is set to '0'; otherwise, .

### 16.5.2 Type-2 HARQ-ACK codebook determination

**<Unchanged parts are omitted>**

#### 16.5.2.1 Type-2 HARQ-ACK codebook in physical uplink control channel

**<Unchanged parts are omitted>**

#### 16.5.2.2 Type-2 HARQ-ACK codebook in physical uplink shared channel

If a UE would multiplex HARQ-ACK information in a PUSCH transmission that is not scheduled by a DCI format or is scheduled by DCI format 0\_0, then

- if the UE has not received any PDCCH within the monitoring occasions for DCI format 3\_0 for scheduling PSSCH with corresponding PSFCH reception occasions on any serving cell and the UE does not have HARQ-ACK information in response to a PSSCH transmission with corresponding PSFCH reception occasions associated with a SL configured grant to multiplex in the PUSCH, as described in Subclause 16.5.2.1, the UE does not multiplex HARQ-ACK information in the PUSCH transmission;

- else, the UE generates the HARQ-ACK codebook as described in Subclause 16.5.2.1.

If a UE multiplexes HARQ-ACK information in a PUSCH transmission that is scheduled by DCI format 0\_1, the UE generates the HARQ-ACK codebook as described in Subclause 16.5.2.1, with the following modifications:

- For the pseudo-code for the HARQ-ACK codebook generation in Subclause 16.5.2.1, after the completion of the  loop, the UE sets where is the value of the SAI field in DCI format 0\_1 according to Table 16.5.2.2-1.

If a UE is scheduled for a PUSCH transmission by DCI format 0\_1 with SAI field value and the UE has not received any PDCCH within the monitoring occasions for PDCCH with DCI format 3\_0 for scheduling PSSCH with corresponding PSFCH reception occasions on a serving cell and the UE does not have HARQ-ACK information in response to PSFCH reception occasions to multiplex in the PUSCH, as described in Subclause 16.5.2.1, the UE does not multiplex HARQ-ACK information in the PUSCH transmission.

Table 16.5.2.2-1: Value of SAI in DCI format 0\_1

|  |  |  |
| --- | --- | --- |
| SAIMSB, LSB |   | Number of PDCCH monitoring occasion in which DCI format 3\_0 scheduling PSSCH transmission(s) with corresponding PSFCH reception occasion(s) is present, denoted as  and  |
| 0,0 | 1 |  |
| 0,1 | 2 |  |
| 1,0 | 3 |  |
| 1,1 | 4 |  |

# References

1. R1-2003178, “Corrections on Sidelink” (endorsed), Samsung, RAN1#100bis-e, April 2020.