**3GPP TSG RAN WG1 #107-e R1-211xxxx**

**e-Meeting, November 11th – 19th, 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **38.213** | **CR** | **draft** | **rev** | **0** | **Current version:** | **16.7.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | [Draft] CR on SL HARQ-ACK feedback reporting to gNB |
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| ***Source to WG:*** | Moderator (Intel Corporation), Ericsson, LGE, NTT DOCOMO, Bosch, Qualcomm, vivo, ZTE, Sanechips, CATT, GOHIGH, Sharp, Huawei, HiSilicon, OPPO, Samsung |
| ***Source to TSG:*** | RAN WG1 |
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| ***Work item code:*** | 5G\_V2X\_NRSL-Core |  | ***Date:*** | 2021-11-19 |
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| ***Category:*** | ***F*** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | This CR is an outcome of RAN1#107-e email discussion [107-e-NR-5G\_V2X-07]. The outcome of the email discussion is also summarized in R1-2112701. The email discussion was based on the input draft CR in R1-2111475. Current specification in 38.213, section 16.5, for the case when NACK-only groupcast feedback mode is in use, provides a wrong resulting HARQ feedback in UCI towards gNB.* Usage of wording “for each” PSFCH reception occasion leads to the interpretation that ACK is sent when after every PSFCH occasion there was absense of PSFCH reception. See Table 1 and Figure 1 for illustration.
* As per the previous agreements from RAN1#98bis and RAN1#101-e (pasted below) only the last PSFCH reception occasion needs to be checked, i.e. only the last occasion has the final HARQ feedback status. Note, that there is only one HARQ-ACK bit reported on UCI after the last PSFCH occasion, as per agreements and spec.

Agreements (RAN1#98bis):* For a configured grant in Mode 1 when using SL HARQ feedback:
	+ There is only one HARQ-ACK bit for the configured grant
	+ There is one PUCCH transmission occasion after the last resource in the set of resources provided by a configured grant.

Working assumption: (RAN1#101-e)* For a dynamic grant in Mode 1 when using SL HARQ feedback:
	+ There is one PUCCH transmission occasion after the last resource in the set of resources provided by a dynamic grant.
	+ To include it as part of the reply LS to RAN2 to solicit views from RAN2

Figure 1. Illustration of UCI reporting after the last SL transmission resource in Mode-1Table 1. Resulting UCI payload for current spec and suggested correction, based on example reception of three PSFCH occasions.

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| **PSFCH-0** | **PSFCH-1** | **PSFCH-2** | **UCI (intended)** | **UCI (implemented)** |
| NACK detected | NACK detected | NACK detected | NACK | NACK |
| NACK detected | NACK detected | No NACK detected | ACK | NACK |
| NACK detected | No NACK detected | No NACK detected since nothing was requested | ACK | NACK |
| No NACK detected | No NACK detected since nothing was requested | No NACK detected since nothing was requested | ACK | ACK |

For the unicast case, similar issue is spotted with respect to determination of HARQ-ACK from the number of PSFCH reception occasions. |
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| ***Summary of change:*** | In the case of NACK-only feedback transmission and its forwarding to gNB, generate ACK when the UE determines absence of PSFCH reception for the last PSFCH reception occasion from the number of PSFCH reception occasions, instead of when the UE determines absense of PSFCH reception for each PSFCH recption occasion.Similar issue is fixed for the case on unicast ACK/NACK feedback. |
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| ***Consequences if not approved:*** | A UE in many cases reports NACK to gNB although SL feedback was considered as ACK. gNB may allocate further retransmissions, although those are not needed. |
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| ***Clauses affected:*** | 16.5 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** |  |

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

A UE can be provided PUCCH resources or PUSCH resources [12, TS 38.331] to report HARQ-ACK information that the UE generates based on HARQ-ACK information that the UE obtains from PSFCH receptions, or from absence of PSFCH receptions. The UE reports HARQ-ACK information on the primary cell of the PUCCH group, as described in clause 9, of the cell where the UE monitors PDCCH for detection of DCI format 3\_0.

For SL configured grant Type 1 or Type 2 PSSCH transmissions by a UE within a time period provided by *sl-PeriodCG*, the UE generates one HARQ-ACK information bit in response to the PSFCH receptions to multiplex in a PUCCH transmission occasion that is after a last time resource, in a set of time resources.

For PSSCH transmissions scheduled by a DCI format 3\_0, a UE generates HARQ-ACK information in response to PSFCH receptions to multiplex in a PUCCH transmission occasion that is after a last time resource in a set of time resources provided by the DCI format 3\_0.

From a number of PSFCH reception occasions, the UE generates HARQ-ACK information to report in a PUCCH or PUSCH transmission. The UE can be indicated by a SCI format to perform one of the following and the UE constructs a HARQ-ACK codeword with HARQ-ACK information, when applicable

- for one or more PSFCH reception occasions associated with SCI format 2-A with Cast type indicator field value of "10"

- generate HARQ-ACK information with same value as a value of HARQ-ACK information the UE determines from the last PSFCH reception from the number of PSFCH reception occasions corresponding to PSSCH transmissions or, if the UE determines that a PSFCH is not received at the last PSFCH reception occasion and ACK is not received in any of previous PSFCH reception occasions, generate NACK

- for one or more PSFCH reception occasions associated with SCI format 2-A with Cast type indicator field value of "01"

- generate ACK if the UE determines ACK from at least one PSFCH reception occasion, from the number of PSFCH reception occasions corresponding to PSSCH transmissions, in PSFCH resources corresponding to every identity $M\_{ID}$ of the UEs that the UE expects to receive the PSSCH, as described in clause 16.3; otherwise, generate NACK

- for one or more PSFCH reception occasions associated with SCI format 2-B or SCI format 2-A with Cast type indicator field value of "11"

- generate ACK when the UE determines absence of PSFCH reception for the last PSFCH reception occasion from the number of PSFCH reception occasions corresponding to PSSCH transmissions; otherwise, generate NACK

**<unchanged parts omitted>**