**3GPP TSG RAN WG1 Meeting #109-eR1-2205299**

**e-Meeting, May 9th – 20th, 2022**

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| *CR-Form-v12.2* |
| **[draft] CHANGE REQUEST** |
|  |
|  | **38.213** | **CR** | **0306** | **rev** |  | **Current version:** | **16.9.0** |  |
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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:***  | CR on reporting sidelink HARQ-ACK on uplink for SL CG Type 2 PSSCH transmission |
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| ***Source to WG:*** | Moderator (NEC) |
| ***Source to TSG:*** | RAN WG1 |
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| ***Work item code:*** | 5G\_V2X\_NRSL-Core |  | ***Date:*** | 2022-05-13 |
|  |  |  |  |  |
| ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | To align sidelink operation with the relevant modification on Uu (CR in R1-2202898), during the discussion on [109-e-R16-V2X-01], issues related to sidelink HARQ-ACK reporting on uplink were discussed, including how to identify PUCCH resource and generate Type-2 HARQ-ACK codebook for the PSSCH transmission(s) associated with activation DCI format 3\_0. |
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| ***Summary of change:*** | Modification in 16.5 :* A PUCCH resource corresponding to the PSSCH transmission(s) of SL configured grant Type 2, clarifying that ”including *the PSSCH transmission(s) associated with the corresponding activation DCI format 3\_0*”, is provided by *sl-N1PUCCH-AN-Type2*;
* “PUCCH resource indicator field” in DCI format 3\_0 for the SL configured grant Type 2 activation is to be ignored;

Modification in 16.5.2.1:* SAI field in DCI format 3\_0 for the SL configured grant Type 2 activation is to be ignored;
* The PSSCH transmission(s) associated with a corresponding activation DCI format 3\_0 should be considered as SL configured grant PSSCH transmission(s) in HARQ-ACK information multiplexing to the $O^{ACK}$ HARQ-ACK information bits.
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| ***Consequences if not approved:*** | It is not clear whether the PSSCH transmission(s) of SL CG Type 2 activated by DCI format 3\_0 should be considered as SL CG PSSCH or dynamically granted PSSCH. This leads to different understandings of how the HARQ-ACK for the PSSCH transmission(s) activated by DCI format 3\_0 should be transmitted.According to the CR, the understanding of SL HARQ-ACK reporting between gNB and sidelink UE should be aligned. |
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| ***Clauses affected:*** | 16.5, 16.5.2.1 |
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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:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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

**<Unchanged parts omitted>**

With reference to slots for PUCCH transmissions and for a number of PSFCH reception occasions ending in slot $n$, the UE provides the generated HARQ-ACK information in a PUCCH transmission within slot $n+k$, subject to the overlapping conditions in clause 9.2.5, where $k$ is a number of slots indicated by a PSFCH-to-HARQ\_feedback timing indicator field, if present, in a DCI format indicating a slot for PUCCH transmission to report the HARQ-ACK information, or $k$ is provided by *sl-PSFCH-ToPUCCH* for a transmission scheduled by a DCI format or for a SL configured grant type 2, or by *sl-PSFCH-ToPUCCH-CG-Type1* for a SL configured grant type 1. $k=0$ corresponds to a last slot for a PUCCH transmission that would overlap with the last PSFCH reception occasion assuming that the start of the sidelink frame is same as the start of the downlink frame [4, TS 38.211].

For a PSSCH transmission by a UE that is scheduled by a DCI format, or for a SL configured grant Type 2 PSSCH transmission activated by a DCI format, the DCI format indicates to the UE that a PUCCH resource is not provided when a value of the PUCCH resource indicator field is zero and a value of PSFCH-to-HARQ feedback timing indicator field, if present, is zero. For a SL configured grant Type 2 PSSCH transmission without a corresponding PDCCH, the DCI format activating the SL configured grant Type 2 indicates to the UE that a PUCCH resource is not provided when a value of the PUCCH resource indicator field is zero and a value of PSFCH-to-HARQ feedback timing indicator field, if present, is zero. For a SL configured grant Type 1 PSSCH transmission, a PUCCH resource can be provided by sl-N1PUCCH-AN and sl-PSFCH-ToPUCCH-CG-Type1. For transmission of HARQ-ACK information corresponding only to a SL configured grant Type 2 PSSCH transmission ~~without a corresponding PDCCH~~, including the PSSCH transmission(s) associated with the corresponding activation DCI format 3\_0, a UE can be provided a PUCCH resource by sl-N1PUCCH-AN-Type2. If a PUCCH resource is not provided, the UE does not transmit a PUCCH with generated HARQ-ACK information from PSFCH reception occasions.

For a PUCCH transmission with HARQ-ACK information, a UE determines a PUCCH resource after determining a set of PUCCH resources from up to four PUCCH resource sets provided by *sl-PUCCH-Config*, for 𝑂𝑈𝐶𝐼 HARQ-ACK information bits, as described in clause 9.2.1. The PUCCH resource determination is based on a PUCCH resource indicator field [5, TS 38.212] in a last DCI format 3\_0, excluding DCI format 3\_0 for the SL configured grant Type 2 activation, among the DCI formats 3\_0 that have a value of a PSFCH-to-HARQ\_feedback timing indicator field indicating a same slot for the PUCCH transmission, that the UE detects and for which the UE transmits corresponding HARQ-ACK information in the PUCCH where, for PUCCH resource determination, detected DCI formats are indexed in an ascending order across PDCCH monitoring occasion indexes.

**<Unchanged parts omitted>**

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

**<Unchanged parts omitted>**

The set of PDCCH monitoring occasions for DCI format 3\_0 for scheduling PSSCH transmissions with associated PSFCH reception occasions is defined as the PDCCH monitoring occasions in the active DL BWP of the configured serving cell, indexed in ascending order of start time of the associated search space sets. The cardinality of the set of PDCCH monitoring occasions defines a total number $M$ of PDCCH monitoring occasions.

A value of a counter sidelink assignment indicator (SAI) field in DCI format 3\_0, excluding DCI format 3\_0 for the SL configured grant Type 2 activation, denotes an accumulative number of PDCCH monitoring occasions where PSSCH transmissions with associated PSFCH receptions are scheduled, up to a current PDCCH monitoring occasion, in ascending order of PDCCH monitoring occasion index $m$, where $0\leq m<M$.

Denote by $V\_{C-SAI,m}^{SL}$ the value of the counter SAI in DCI format 3\_0 in PDCCH monitoring occasion $m$ according to Table 16.5.2.1-1.

If the UE transmits HARQ-ACK information in a PUCCH in slot $n$, the UE determines the $\tilde{o}\_{0}^{ACK},\tilde{o}\_{1}^{ACK},…,\tilde{o}\_{O^{ACK}-1}^{ACK}$, for a total number of $O\_{ACK}$ HARQ-ACK information bits, according to the following pseudo-code:

Set $m=0$ – PDCCH with DCI format 3\_0 monitoring occasion index: lower index corresponds to earlier PDCCH with DCI format 3\_0 monitoring occasion

Set $j=0$

Set $V\_{temp}=0$

Set $V\_{s}=∅$

Set $M$ to the number of PDCCH monitoring occasions

while $m<M$

if PDCCH monitoring occasion $m$ is before an active UL BWP change on the PCell

$m=M$;

else

if there is a PSFCH reception occasion associated with a PSSCH transmission scheduled by a DCI format in PDCCH monitoring occasion $m$

if $V\_{C-SAI,m}^{SL}\leq V\_{temp}$

$j=j+1$;

end if

$V\_{temp}=V\_{C-SAI,m}^{SL}$

$\tilde{o}\_{4j+V\_{C-SAI,m}^{SL}-1}^{ACK}$ = HARQ-ACK information bit

$V\_{s}=V\_{s}∪\left\{4j+V\_{C-SAI,m}^{SL}-1\right\}$

end if

end if

$m=m+1$;

end while

$O^{ACK}=4⋅j+V\_{temp}$

$\tilde{o}\_{i}^{ACK}=NACK$ for any $i \in \left\{0,1,…,O^{ACK}-1\right\}\V\_{s} $

if a SL configured grant Type 1 is configured for a UE, or a SL configured grant Type 2 is configured and activated for a UE, and the SL configured grant provides a grant for PSSCH transmissions, including the PSSCH transmission(s) associated with the corresponding activation DCI format 3\_0, with PSFCH reception occasions in a slot $n-K\_{1}$, where $K\_{1}$ is the PSFCH-to-HARQ-feedback timing value for the SL configured grant

$O^{ACK}=O^{ACK}+1$;

$o\_{O^{ACK}-1}^{ACK}$= HARQ-ACK information bit associated with the PSFCH reception occasions associated with the PSSCH transmissions scheduled by the SL configured grant

end if

**<Unchanged parts omitted>**