**3GPP TSG-RAN WG2 Meeting #116 Electronic R2-2111426**

**Online Meeting, November, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.321** | **CR** | **1168** | **rev** | **1** | **Current version:** | **16.6.0** |  |
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| *For* [***HELP***](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:*** | Miscelleneous CR on 38.321 (Rapporteur CR) | | | | | | | | | |
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| ***Source to WG:*** | LG Electronics Inc. | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_V2X\_NRSL-Core | | | | |  | ***Date:*** | | | 2021-10-25 |
|  |  | | | |  | |  | | |  |
| ***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 can be 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. Some editorial errors still exist. 2. S-PSS and S-SSS should be transmitted/received only if SL BWP is active. When SL BWP is deactivated, sidelink scheduling request and buffer status reporting procedure should be cancelled as there is only one SL BWP configured. Similarly, sidelink CSI reporting procedure should be cancelled. Not cancelling these will lead to unnecessary transmssions on Uu interface. 3. In 38.331, both *sl-PSSCH-TxConfigList* and *sl-CBR-PriorityTxConfigList* are optional IE, however, how to handle the case that *sl-PSSCH-TxConfigList* isnot configuredis missing in the MAC specification. 4. At least one sl-TxPoolExceptional pool is always a resource pool in which PSFCH is configured. 5. Based on the RAN1 LS R1-2108438, the fix is to clarify that each unit of this value is incremented by 1 when “none of the resources of a SL grant in each resource reservation period is used”. 6. MAC layer need to indicate the RV value to PHY layer. However, corresponding description is missing. 7. Cross reference needs to be removed. 8. Based on the RAN2 working assumption, UE assumes that next retransmission(s) of the MAC PDU is required when FB is disabled (and PUCCH is configured), for CG, if sl-CG-MaxTransNumList is configured with a value not larger than the number of CG resources available, when sl-CG-MaxTransNum is not reached. | | | | | | | | |
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| ***Summary of change:*** | | 1. Fix the editorial errors in section 5.8.3. 2. transmission/reception for S-PSS and S-SSS and BSR triggering only if SL BWP is active. cancellation of SL CSI reporting, SL BSR reporting and SR reporting upon BWP deactivation. 3. Correction the mac layer description of tx parameters selection. 4. Add the description that exceptional pool is always a resource pool in which PSFCH is configured. 5. Explained that the UE comapres the sl-ReslectAfter threshold with “the number of consecutive unsued transmission opportunity which is incremented by 1 only when none of the resources of the selected sidelink grant within a resource reservation interval is used”. 6. Add the description of MAC indicates the RV value to PHY layer. 7. Cross reference is removed. 8. Add the description that UE send NACK when the FB is disabled and sl-CG-MaxTransNum is not reached. | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. Some editorial errors still exist. 2. Misalignment between 38.331 and 38.321 occurs. UE does not know how to handle the case that “*sl-PSSCH-TxConfigList*” is absent. 3. Mode 2 resource reselection will be erroneously triggered. 4. UE will not transmit the HARQ feedback enabled MAC PDU if the exceptional pool is a resource pool in which PSFCH is configured. 5. Unecessary transmissions on UU for sidelink when sidelink BWP is deactivated. 6. Misalignment between RAN1 and RAN2 occurs. UE does not how to set RV value. 7. The specification includes circular reference. 8. Mode 1 resoure will not be allocated. | | | | | | | | |
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| ***Clauses affected:*** | | 5.8.3, 5.15.2, 5.22.1.1, 5.22.1.2, 5.22.1.3.1, 5.22.1.3.1a, 5.22.1.3.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

START OF THE CHANGE

### 5.8.3 Sidelink

There are two types of transmission without dynamic sidelink grant:

- configured grant Type 1 where an sidelink grant is provided by RRC, and stored as configured sidelink grant;

- configured grant Type 2 where an sidelink grant is provided by PDCCH, and stored or cleared as configured sidelink grant based on L1 signalling indicating configured sidelink grant activation or deactivation.

Type 1 and/or Type 2 are configured with a single BWP. Multiple configurations of up to 8 configured grants (including both Type 1 and Type 2, if configured) can be active simultaneously on the BWP.

RRC configures the following parameters when the configured grant Type 1 is configured, as specified in TS 38.331 [5] or TS 36.331 [21]:

- *sl-ConfigIndexCG*: the identifier of a configured grant for sidelink;

- *sl-CS-RNTI*: SLCS-RNTI for retransmission;

- *sl-NrOfHARQ-Processes*: the number of HARQ processes for configured grant;

- *sl-PeriodCG*: periodicity of the configured grant Type 1;

- *sl-TimeOffsetCG-Type1*: Offset of a resource with respect to reference logical slot defined by *sl-TimeReferenceSFN-Type1* in time domain, referring to the number of logical slots in a resource pool;

- *sl-TimeResourceCG-Type1*: time resource location of the configured grant Type 1;

- *sl-CG-MaxTransNumList*: the maximum number of times that a TB can be transmitted using the configured grant;

*- sl-HARQ-ProcID-offset*: offset of HARQ process for configured grant Type 1;

- *sl-TimeReferenceSFN-Type1*: SFN used for determination of the offset of a resource in time domain. If it is present, the UE uses the first logical slot of associated resource pool after the starting time of the closest SFN with the indicated number preceding the reception of the sidelink configured grant configuration Type 1 as reference logical slot. If it is absent, the indicated reference SFN is zero.

RRC configures the following parameters when the configured grant Type 2 is configured, as specified in TS 38.331 [5]:

- *sl-ConfigIndexCG*: the identifier of a configured grant for sidelink;

- *sl-CS-RNTI*: SLCS-RNTI for activation, deactivation, and retransmission;

- *sl-NrOfHARQ-Processes*: the number of HARQ processes for configured grant;

- *sl-PeriodCG*: periodicity of the configured grant Type 2;

- *sl-CG-MaxTransNumList*: the maximum number of times that a TB can be transmitted using the configured grant;

*- sl-HARQ-ProcID-offset*: offset of HARQ process for configured grant Type 2.

Upon configuration of a configured grant Type 1, the MAC entity shall for each configured sidelink grant:

1> store the sidelink grant provided by RRC as a configured sidelink grant;

1> initialise or re-initialise the configured sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) according to *sl-TimeOffsetCG-Type1* and *sl-TimeResourceCG-Type1*, and to reoccur with *sl-periodCG* for transmissions of multiple MAC PDUs according to clause 8.1.2 of TS 38.214 [7].

NOTE 1: If the MAC entity is configured with multiple configured sidelink grants, collision among the configured sidelink grants may occur. How to handle the collision is left to UE implementation.

After a sidelink grant is configured for a configured grant Type 1, the MAC entity shall consider sequentially that the first slot of the Sth sidelink grant occurs in the logical slot for which:

CURRENT\_slot *=* *(sl-ReferenceSlotCG-Type1* *+* *sl-TimeOffsetCG-Type1* + S × *PeriodicitySL*) modulo T'max

where CURRENT\_slot refers to current logical slot in the associated resource pool,and T'max is the number of slots that belongs to the associated resource pool as defined in clause 8 of TS 38.214[7]. *sl-ReferenceSlotCG-Type1* refers to reference logical slot defined by *sl-TimeReferenceSFN-Type1*.

After a sidelink grant is configured for a configured grant Type 2, the MAC entity shall consider sequentially that the first slot of Sth sidelink grant occurs in the logical slot for which:

CURRENT\_slot = (*sl-StartSlotCG-Type2* + S × *PeriodicitySL*) modulo T'max

where *sl-StartSlotCG-Type2* refers to the logical slot of the first transmission opportunity of PSSCH where the configured sidelink grant was (re)initialised.

When a configured sidelink grant is released by RRC, all the corresponding configurations shall be released and all corresponding sidelink grants shall be cleared.

The MAC entity shall:

1> if the configured sidelink grant confirmation has been triggered and not cancelled; and

1> if the MAC entity has UL resources allocated for new transmission:

2> instruct the Multiplexing and Assembly procedure to generate a Sidelink Configured Grant Confirmation MAC CE as defined in clause 6.1.3.34;

2> cancel the triggered configured sidelink grant confirmation.

For a configured grant Type 2, the MAC entity shall clear the corresponding configured sidelink grant immediately after first transmission of Sidelink Configured Grant Confirmation MAC CE triggered by the configured sidelink grant deactivation.

NEXT OF THE CHANGE

### 5.15.2 Sidelink

In addition to clause 16 of TS 38.213 [6], this clause specifies requirements on BWP operation for sidelink.

The MAC entity is configured with at most a single SL BWP where sidelink transmission and reception are performed.

For a BWP, the MAC entity shall:

1> if the BWP is activated:

2> transmit SL-BCH on the BWP, if configured;

2> transmit S-PSS and S-SSS on the BWP, if configured;

2> transmit PSCCH on the BWP;

2> transmit SL-SCH on the BWP;

2> receive PSFCH on the BWP, if configured.

2> receive S-PSS and S-SSS on the BWP, if configured;

2> receive SL-BCH on the BWP, if configured;

2> receive PSCCH on the BWP;

2> receive SL-SCH on the BWP;

2> transmit PSFCH on the BWP, if configured;2> (re-)initialize any suspended configured sidelink grant of configured grant Type 1.

1> if the BWP is deactivated:

2> not transmit SL-BCH on the BWP, if configured;

2> not transmit S-PSS and S-SSS on the BWP, if configured;

2> not transmit PSCCH on the BWP;

2> not transmit SL-SCH on the BWP;

2> not receive PSFCH on the BWP, if configured.

2> not receive SL-BCH on the BWP, if configured;

2> not receive S-PSS and S-SSS on the BWP, if configured;

2> not receive PSCCH on the BWP;

2> not receive SL-SCH on the BWP;

2> not transmit PSFCH on the BWP, if configured;

2> suspend any configured sidelink grant of configured grant Type 1;

2> clear any configured sidelink grant of configured grant Type 2;

2> cancel, if any, triggered Scheduling Request procedure for sidelink;

2> cancel, if any, triggered Sidelink Buffer Status Reporting procedure;

2> cancel, if any, triggered Sidelink CSI Reporting procedure.

NEXT OF THE CHANGE

#### 5.22.1.1 SL Grant reception and SCI transmission

Sidelink grant is received dynamically on the PDCCH, configured semi-persistently by RRC or autonomously selected by the MAC entity. The MAC entity shall have a sidelink grant on an active SL BWP to determine a set of PSCCH duration(s) in which transmission of SCI occurs and a set of PSSCH duration(s) in which transmission of SL-SCH associated with the SCI occurs. A sidelink grant addressed to SLCS-RNTI with NDI = 1 is considered as a dynamic sidelink grant.

If the MAC entity has been configured with Sidelink resource allocation mode 1 as indicated in TS 38.331 [5], the MAC entity shall for each PDCCH occasion and for each grant received for this PDCCH occasion:

1> if a sidelink grant has been received on the PDCCH for the MAC entity's SL-RNTI:

2> if the NDI received on the PDCCH has not been toggled compared to the value in the previously received HARQ information for the HARQ Process ID:

3> use the received sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) for one or more retransmissions of a single MAC PDU for the corresponding Sidelink process according to clause 8.1.2 of TS 38.214 [7].

2> else:

3> use the received sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) for initial transmission and, if available, retransmission(s) of a single MAC PDU according to clause 8.1.2 of TS 38.214 [7].

2> if a sidelink grant is available for retransmission(s) of a MAC PDU which has been positively acknowledged as specified in clause 5.22.1.3.1a:

3> clear the PSCCH duration(s) and PSSCH duration(s) corresponding to retransmission(s) of the MAC PDU from the sidelink grant.

1> else if a sidelink grant has been received on the PDCCH for the MAC entity's SLCS-RNTI:

2> if PDCCH contents indicate retransmission(s) for the identifed HARQ process ID that has been set for an activated configured sidelink grant identified by *sl-ConfigIndexCG*:

3> use the received sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) for one or more retransmissions of a single MAC PDU according to clause 8.1.2 of TS 38.214 [7].

2> else if PDCCH contents indicate configured grant Type 2 deactivation for a configured sidelink grant:

3> trigger configured sidelink grant confirmation for the configured sidelink grant.

2> else if PDCCH contents indicate configured grant Type 2 activation for a configured sidelink grant:

3> trigger configured sidelink grant confirmation for the configured sidelink grant;

3> store the configured sidelink grant;

3> initialise or re-initialise the configured sidelink grant to determine the set of PSCCH durations and the set of PSSCH durations for transmissions of multiple MAC PDUs according to clause 8.1.2 of TS 38.214 [7].

If the MAC entity has been configured with Sidelink resource allocation mode 2 to transmit using pool(s) of resources in a carrier as indicated in TS 38.331 [5] or TS 36.331 [21] based on sensing or random selection, the MAC entity shall for each Sidelink process:

NOTE 1: If the MAC entity is configured with Sidelink resource allocation mode 2 to transmit using a pool of resources in a carrier as indicated in TS 38.331 [5] or TS 36.331 [21], the MAC entity can create a selected sidelink grant on the pool of resources based on random selection or sensing only after releasing configured sidelink grant(s), if any.

NOTE 2: The MAC entity expects that PSFCH is always configured by RRC for at least one pool of resources in *sl-TxPoolSelectedNormal* and for the resource pool in *sl-TxPoolExceptional* in case that at least a logical channel configured with *sl-HARQ-FeedbackEnabled* is set to *enabled*.

1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmissions of multiple MAC PDUs, and SL data is available in a logical channel:

2> if the MAC entity has not selected a pool of resources allowed for the logical channel:

3> if *sl-HARQ-FeedbackEnabled* is set to *enabled* for the logical channel:

4> select any pool of resources configured with PSFCH resources among the pools of resources;

3> else:

4> select any pool of resources among the pools of resources;

2> perform the TX resource (re-)selection check on the selected pool of resources as specified in clause 5.22.1.2;

NOTE 3: The MAC entity continuously performs the TX resource (re-)selection check until the corresponding pool of resources is released by RRC or the MAC entity decides to cancel creating a selected sidelink grant corresponding to transmissions of multiple MAC PDUs.

2> if the TX resource (re-)selection is triggered as the result of the TX resource (re-)selection check:

3> select one of the allowed values configured by RRC in *sl-ResourceReservePeriodList* and set the resource reservation interval, , with the selected value;

NOTE 3A: The MAC entity selects a value for the resource reservation interval which is larger than the remaining PDB of SL data available in the logical channel.

3> randomly select, with equal probability, an integer value in the interval [5, 15] for the resource reservation interval higher than or equal to 100ms or in the interval for the resource reservation interval lower than 100ms and set *SL\_RESOURCE\_RESELECTION\_COUNTER* to the selected value;

3> select the number of HARQ retransmissions from the allowed numbers ,if configured by RRC, in *sl-MaxTxTransNumPSSCH* included in *sl-PSSCH-TxConfigList* and, if configured by RRC, overlapped in *sl-MaxTxTransNumPSSCH* indicated in *sl-CBR-PriorityTxConfigList* for the highest priority of the logical channel(s) allowed on the carrier and the CBR measured by lower layers according to clause 5.1.27 of TS 38.215 [24] if CBR measurement results are available or the corresponding *sl-defaultTxConfigIndex* configured by RRC if CBR measurement results are not available;

3> select an amount of frequency resources within the range ,if configured by RRC, between *sl-MinSubChannelNumPSSCH* and *sl-MaxSubchannelNumPSSCH* included in *sl-PSSCH-TxConfigList* and, if configured by RRC, overlapped between *MinSubChannelNumPSSCH* and *MaxSubchannelNumPSSCH* indicated in *sl-CBR-PriorityTxConfigList* for the highest priority of the logical channel(s) allowed on the carrier and the CBR measured by lower layers according to clause 5.1.27 of TS 38.215 [24] if CBR measurement results are available or the corresponding *sl-defaultTxConfigIndex* configured by RRC if CBR measurement results are not available;

3> if transmission based on random selection is configured by upper layers:

4> randomly select the time and frequency resources for one transmission opportunity from the resources pool, according to the amount of selected frequency resources and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier.

3> else:

4> randomly select the time and frequency resources for one transmission opportunity from the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7], according to the amount of selected frequency resources and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier.

3> use the randomly selected resource to select a set of periodic resources spaced by the resource reservation interval for transmissions of PSCCH and PSSCH corresponding to the number of transmission opportunities of MAC PDUs determined in TS 38.214 [7];

3> if one or more HARQ retransmissions are selected:

4> if transmission based on sensing is configured by upper layers and there are available resources left in the resources indicated by the physical layer according to clause 8.1.4 of TS 38.214 [7] for more transmission opportunities; or

4> if transmission based on random selection is configured by upper layers and there are available resources left in the resource pool for more transmission opportunities:

5> randomly select the time and frequency resources for one or more transmission opportunities from the available resources, according to the amount of selected frequency resources, the selected number of HARQ retransmissions and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier by ensuring the minimum time gap between any two selected resources in case that PSFCH is configured for this pool of resources and that a retransmission resource can be indicated by the time resource assignment of a prior SCI according to clause 8.3.1.1 of TS 38.212 [9];

5> use the randomly selected resource to select a set of periodic resources spaced by the resource reservation interval for transmissions of PSCCH and PSSCH corresponding to the number of retransmission opportunities of the MAC PDUs determined in TS 38.214 [7];

5> consider the first set of transmission opportunities as the initial transmission opportunities and the other set(s) of transmission opportunities as the retransmission opportunities;

5> consider the sets of initial transmission opportunities and retransmission opportunities as the selected sidelink grant.

3> else:

4> consider the set as the selected sidelink grant.

3> use the selected sidelink grant to determine the set of PSCCH durations and the set of PSSCH durations according to TS 38.214 [7].

2> else if *SL\_RESOURCE\_RESELECTION\_COUNTER* = 0 and when *SL\_RESOURCE\_RESELECTION\_COUNTER* was equal to 1 the MAC entity randomly selected, with equal probability, a value in the interval [0, 1] which is less than or equal to the probability configured by RRC in *sl-ProbResourceKeep*:

3> clear the selected sidelink grant, if available;

3> randomly select, with equal probability, an integer value in the interval [5, 15] for the resource reservation interval higher than or equal to 100ms or in the interval for the resource reservation interval lower than 100ms and set *SL\_RESOURCE\_RESELECTION\_COUNTER* to the selected value;

3> reuse the previously selected sidelink grant for the number of transmissions of the MAC PDUs determined in TS 38.214 [7] with the resource reservation interval to determine the set of PSCCH durations and the set of PSSCH durations according to TS 38.214 [7].

1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmission(s) of a single MAC PDU, and if SL data is available in a logical channel, or a SL-CSI reporting is triggered:

2> if SL data is available in the logical channel:

3> if *sl-HARQ-FeedbackEnabled* is set to *enabled* for the logical channel:

4> select any pool of resources configured with PSFCH resources among the pools of resources;

3> else:

4> select any pool of resources among the pools of resources;

2> else if a SL-CSI reporting is triggered:

3> select any pool of resources among the pools of resources.

2> perform the TX resource (re-)selection check on the selected pool of resources as specified in clause 5.22.1.2;

2> if the TX resource (re-)selection is triggered as the result of the TX resource (re-)selection check:

3> select the number of HARQ retransmissions from the allowed numbers ,if configured by RRC, in *sl-MaxTxTransNumPSSCH* included in *sl-PSSCH-TxConfigList* and, if configured by RRC, overlapped in *sl-MaxTxTransNumPSSCH* indicated in *sl-CBR-PriorityTxConfigList* for the highest priority of the logical channel(s) allowed on the carrier and the CBR measured by lower layers according to clause 5.1.27 of TS 38.215 [24] if CBR measurement results are available or the corresponding *sl-defaultTxConfigIndex* configured by RRC if CBR measurement results are not available;

3> select an amount of frequency resources within the range ,if configured by RRC, between *sl-MinSubChannelNumPSSCH* and *sl-MaxSubChannelNumPSSCH* included in *sl-PSSCH-TxConfigList* and, if configured by RRC, overlapped between *sl-MinSubChannelNumPSSCH* and *sl-MaxSubChannelNumPSSCH* indicated in *sl-CBR-PriorityTxConfigList* for the highest priority of the logical channel(s) allowed on the carrier and the CBR measured by lower layers according to clause 5.1.27 of TS 38.215 [24] if CBR measurement results are available or the corresponding *sl-defaultTxConfigIndex* configured by RRC if CBR measurement results are not available;

3> if transmission based on random selection is configured by upper layers:

4> randomly select the time and frequency resources for one transmission opportunity from the resources pool, according to the amount of selected frequency resources and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier, and the latency requirement of the triggered SL CSI reporting;

3> else:

4> randomly select the time and frequency resources for one transmission opportunity from the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7], according to the amount of selected frequency resources and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier, and/or the latency requirement of the triggered SL-CSI reporting;

3> if one or more HARQ retransmissions are selected:

4> if transmission based on sensing is configured by upper layers and there are available resources left in the resources indicated by the physical layer according to clause 8.1.4 of TS 38.214 [7] for more transmission opportunities; or

4> if transmission based on random selection is configured by upper layers and there are available resources left in the resources pool for more transmission opportunities:

5> randomly select the time and frequency resources for one or more transmission opportunities from the available resources, according to the amount of selected frequency resources, the selected number of HARQ retransmissions and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier, and/or the latency requirement of the triggered SL-CSI by ensuring the minimum time gap between any two selected resources in case that PSFCH is configured for this pool of resources, and that a retransmission resource can be indicated by the time resource assignment of a prior SCI according to clause 8.3.1.1 of TS 38.212 [9];

5> consider a transmission opportunity which comes first in time as the initial transmission opportunity and other transmission opportunities as the retransmission opportunities;

5> consider all the transmission opportunities as the selected sidelink grant;

3> else:

4> consider the set as the selected sidelink grant;

3> use the selected sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) according to TS 38.214 [7].

NOTE 3B: If retransmission resource(s) cannot be selected by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resources for one or more transmission opportunities from the available resources is left for UE implementation by ensuring the minimum time gap between any two selected ‎resources in case that PSFCH is configured for this pool of ‎resources.

1> if a selected sidelink grant is available for retransmission(s) of a MAC PDU which has been positively acknowledged as specified in clause 5.22.1.3.3:

2> clear the PSCCH duration(s) and PSSCH duration(s) corresponding to retransmission(s) of the MAC PDU from the selected sidelink grant.

NOTE 3C: How the MAC entity determines the remaining PDB of SL data is left to UE implementation.

For a selected sidelink grant, the minimum time gap between any two selected resources comprises:

- a time gap between the end of the last symbol of a PSSCH transmission of the first resource and the start of the first symbol of the corresponding PSFCH reception determined by *sl-MinTimeGapPSFCH* and *sl-PSFCH-Period* for the pool of resources; and

- a time required for PSFCH reception and processing plus sidelink retransmission preparation including multiplexing of necessary physical channels and any TX-RX/RX-TX switching time.

NOTE 4: How to determine the time required for PSFCH reception and processing plus sidelink retransmission preparation is left to UE implementation.

The MAC entity shall for each PSSCH duration:

1> for each sidelink grant occurring in this PSSCH duration:

2> select a MCS table allowed in the pool of resource which is associated with the sidelink grant;

NOTE 4a: MCS table selection is up to UE implementation if more than one MCS table is configured.

2> if the MAC entity has been configured with Sidelink resource allocation mode 1:

3> select a MCS which is, if configured, within the range that is configured by RRC between *sl-MinMCS-PSSCH* and *sl-MaxMCS-PSSCH* associated with the selected MCS table included in *sl-ConfigDedicatedNR*;

3> set the resource reservation interval to 0ms.

2> else:

3> select a MCS which is, if configured, within the range ,if configured by RRC, between *sl-MinMCS-PSSCH* and *sl-MaxMCS-PSSCH* associated with the selected MCS table included in *sl-PSSCH-TxConfigList* and, if configured by RRC, overlapped between *sl-MinMCS-PSSCH* and *sl-MaxMCS-PSSCH* associated with the selected MCS table indicated in *sl-CBR-PriorityTxConfigList* for the highest priority of the sidelink logical channel(s) in the MAC PDU and the CBR measured by lower layers according to clause 5.1.27 of TS 38.215 [24] if CBR measurement results are available or the corresponding *sl-defaultTxConfigIndex* configured by RRC if CBR measurement results are not available;

3> if the MAC entity decides not to use the selected sidelink grant for the next PSSCH duration corresponding to an initial transmission opportunity:

4> set the resource reservation interval to 0ms.

3> else:

4> set the resource reservation interval to the selected value.

NOTE 5: MCS selection is up to UE implementation if the MCS or the corresponding range is not configured by RRC.

2> if the configured sidelink grant has been activated and this PSSCH duration corresponds to the first PSSCH transmission opportunity within this *sl-PeriodCG* of the configured sidelink grant:

3> set the HARQ Process ID to the HARQ Process ID associated with this PSSCH duration and, if available, all subsequent PSSCH duration(s) occuring in this *sl-PeriodCG* for the configured sidelink grant;

3> determine that this PSSCH duration is used for initial transmission;

3> flush the HARQ buffer of Sidelink process associated with the HARQ Process ID.

2> deliver the sidelink grant, the selected MCS, and the associated HARQ information to the Sidelink HARQ Entity for this PSSCH duration.

For configured sidelink grants, the HARQ Process ID associated with the first slot of a SL transmission is derived from the following equation:

HARQ Process ID = [floor(CURRENT\_slot / *PeriodicitySL*)] modulo *sl-NrOfHARQ-Processes* + *sl-HARQ-ProcID-offset*

where CURRENT\_slot refers to current logical slot in the associated resource pool, and *PeriodicitySL* is defined in clause 5.8.3.

NEXT OF THE CHANGE

#### 5.22.1.2 TX resource (re-)selection check

If the TX resource (re-)selection check procedure is triggered on the selected pool of resources for a Sidelink process according to clause 5.22.1.1, the MAC entity shall for the Sidelink process:

1> if *SL\_RESOURCE\_RESELECTION\_COUNTER* = 0 and when *SL\_RESOURCE\_RESELECTION\_COUNTER* was equal to 1 the MAC entity randomly selected, with equal probability, a value in the interval [0, 1] which is above the probability configured by RRC in *sl-ProbResourceKeep*; or

1> if the pool of resources is configured or reconfigured by RRC; or

1> if there is no selected sidelink grant on the selected pool of resources; or

1> if neither transmission nor retransmission has been performed by the MAC entity on any resource indicated in the selected sidelink grant during the last second; or

1> if *sl-ReselectAfter* is configured and the number of consecutive unused transmission opportunities on resources indicated in the selected sidelink grant, which is incremented by 1 when none of the resources of the selected sidelink grant within a resource reservation interval is used, is equal to *sl-ReselectAfter*; or

1> if the selected sidelink grant cannot accommodate a RLC SDU by using the maximum allowed MCS configured by RRC in *sl-MaxMCS-PSSCH* associated with the selected MCS table and the UE selects not to segment the RLC SDU; or

NOTE 1: If the selected sidelink grant cannot accommodate the RLC SDU, it is left for UE implementation whether to perform segmentation or sidelink resource reselection.

1> if transmission(s) with the selected sidelink grant cannot fulfil the remaining PDB of the data in a logical channel according to the associated priority, and the MAC entity selects not to perform transmission(s) corresponding to a single MAC PDU:

NOTE 2: If the remaining PDB is not met, it is left for UE implementation whether to perform transmission(s) corresponding to single MAC PDU or sidelink resource reselection.

NOTE 3: It is left for UE implementation whether to trigger the TX resource (re-)selection due to the latency requirement of the MAC CE triggered according to clause 5.22.1.7.

2> clear the selected sidelink grant associated to the Sidelink process, if available;

2> trigger the TX resource (re-)selection.

NOTE 4: Void.

NOTE 5: Void.

NEXT OF THE CHANGE

##### 5.22.1.3.1 Sidelink HARQ Entity

The MAC entity includes at most one Sidelink HARQ entity for transmission on SL-SCH, which maintains a number of parallel Sidelink processes.

The maximum number of transmitting Sidelink processes associated with the Sidelink HARQ Entity is 16. A sidelink process may be configured for transmissions of multiple MAC PDUs. For transmissions of multiple MAC PDUs with Sidelink resource allocation mode 2, the maximum number of transmitting Sidelink processes associated with the Sidelink HARQ Entity is 4.

A delivered sidelink grant and its associated Sidelink transmission information are associated with a Sidelink process. Each Sidelink process supports one TB.

For each sidelink grant, the Sidelink HARQ Entity shall:

1> if the MAC entity determines that the sidelink grant is used for initial transmission as specified in clause 5.22.1.1; or

1> if the sidelink grant is a configured sidelink grant and no MAC PDU has been obtained in a *sl-PeriodCG* of the configured sidelink grant:

NOTE 1: Void.

2> (re-)associate a Sidelink process to this grant, and for the associated Sidelink process:

NOTE 1A: The Sidelink HARQ Entity will associate the selected sidelink grant to the Sidelink process determined by the MAC entity.

3> obtain the MAC PDU to transmit from the Multiplexing and assembly entity, if any;

3> if a MAC PDU to transmit has been obtained:

4> if a HARQ Process ID has been set for the sidelink grant:

5> (re-)associate the HARQ Process ID corresponding to the sidelink grant to the Sidelink process;

NOTE 1a: There is one-to-one mapping between a HARQ Process ID and a Sidelink process in the MAC entity configured with Sidelink resource allocation mode 1.

4> determines Sidelink transmission information of the TB for the source and destination pair of the MAC PDU as follows:

5> set the Source Layer-1 ID to the 8 LSB of the Source Layer-2 ID of the MAC PDU;

5> set the Destination Layer-1 ID to the 16 LSB of the Destination Layer-2 ID of the MAC PDU;

5> (re-)associate the Sidelink process to a Sidelink process ID;

NOTE 1b: How UE determine Sidelink process ID in SCI is left to UE implementation for NR sidelink.

5> consider the NDI to have been toggled compared to the value of the previous transmission corresponding to the Sidelink identification information and the Sidelink process ID of the MAC PDU and set the NDI to the toggled value;

NOTE 2: The initial value of the NDI set to the very first transmission for the associated Sidelink process is left to UE implementation.

NOTE 3: Void.

5> set the cast type indicator to one of broadcast, groupcast and unicast as indicated by upper layers;

5> if HARQ feedback has been enabled for the MAC PDU according to clause 5.22.1.4.2;

6> set the HARQ feedback enabled/disabled indicator to *enabled*.

5> else:

6> set the HARQ feedback enabled/disabled indicator to *disabled*.

5> set the priority to the value of the highest priority of the logical channel(s), if any, and a MAC CE, if included, in the MAC PDU;

5> if HARQ feedback is enabled for groupcast:

6> if both a group size and a member ID are provided by upper layers and the group size is not greater than the number of candidate PSFCH resources associated with this sidelink grant:

7> select either positive-negative acknowledgement or negative-only acknowledgement.

NOTE 4: Selection of positive-negative acknowledgement or negative-only acknowledgement is up to UE implementation.

5>set the Redundancy version to the selected value.

6> else:

7> select negative-only acknowledgement.

6> if negative-only acknowledgement is selected, UE's location information is available, and *sl-TransRange* has been configured for a logical channel in the MAC PDU, and *sl-ZoneConfig* is configured as specified in TS 38.331 [5]:

7> set the communication range requirement to the value of the longest communication range of the logical channel(s) in the MAC PDU;

7> determine the value of *sl-ZoneLength* corresponding to the communication range requirement and set Zone\_id to the value of Zone\_id calculated using the determined value of *sl-ZoneLength* as specified in TS 38.331 [5].

4> deliver the MAC PDU, the sidelink grant and the Sidelink transmission information of the TB to the associated Sidelink process;

4> instruct the associated Sidelink process to trigger a new transmission.

3> else:

4> flush the HARQ buffer of the associated Sidelink process.

1> else (i.e. retransmission):

2> if the HARQ Process ID corresponding to the sidelink grant received on PDCCH, the configured sidelink grant or the selected sidelink grant is associated to a Sidelink process of which HARQ buffer is empty; or

2> if the HARQ Process ID corresponding to the sidelink grant received on PDCCH is not associated to any Sidelink process:

3> ignore the sidelink grant.

2> else:

3> identify the Sidelink process associated with this grant, and for the associated Sidelink process:

4> deliver the sidelink grant of the MAC PDU to the associated Sidelink process;

4> instruct the associated Sidelink process to trigger a retransmission.

NEXT OF THE CHANGE

##### 5.22.1.3.1a Sidelink process

The Sidelink process is associated with a HARQ buffer.

New transmissions and retransmissions are performed on the resource indicated in the sidelink grant as specified in clause 5.22.1.1 and with the MCS selected as specified in clause 8.1.3.1 of TS 38.214 [7] and clause 5.22.1.1.

If the Sidelink process is configured to perform transmissions of multiple MAC PDUs with Sidelink resource allocation mode 2, the process maintains a counter *SL\_RESOURCE\_RESELECTION\_COUNTER*. For other configurations of the Sidelink process, this counter is not available.

If the Sidelink HARQ Entity requests a new transmission, the Sidelink process shall:

1> store the MAC PDU in the associated HARQ buffer;

1> store the sidelink grant received from the Sidelink HARQ Entity;

1> generate a transmission as described below.

If the Sidelink HARQ Entity requests a retransmission, the Sidelink process shall:

1> store the sidelink grant received from the Sidelink HARQ Entity;

1> generate a transmission as described below.

To generate a transmission, the Sidelink process shall:

1> if there is no uplink transmission; or

1> if the MAC entity is able to simultaneously perform uplink transmission(s) and sidelink transmission at the time of the transmission; or

1> if the other MAC entity and the MAC entity are able to simultaneously perform uplink transmission(s) and sidelink transmission at the time of the transmission respectively; or

1> if there is a MAC PDU to be transmitted for this duration in uplink, except a MAC PDU obtained from the Msg3 buffer, the MSGA buffer, or prioritized as specified in clause 5.4.2.2, and the sidelink transmission is prioritized over uplink transmission:

2> instruct the physical layer to transmit SCI according to the stored sidelink grant with the associated Sidelink transmission information;

2> instruct the physical layer to generate a transmission according to the stored sidelink grant;

2> if HARQ feedback has been enabled the MAC PDU according to clause 5.22.1.4.2:

3> instruct the physical layer to monitor PSFCH for the transmission and perform PSFCH reception as specified in clause 5.22.1.3.2.

2> if *sl-PUCCH-Config* is configured by RRC for the stored sidelink grant:

3> determine transmission of an acknowledgement on the PUCCH as specified in clause 5.22.1.3.2.

1> if this transmission corresponds to the last transmission of the MAC PDU:

2> decrement *SL\_RESOURCE\_RESELECTION\_COUNTER* by 1, if available.

NOTE 1: If the number of HARQ retransmissions selected by the MAC entity has been reached, or if a positive acknowledgement to a transmission of the MAC PDU has been received, or if a negative-only acknowledgement was enabled in the SCI and no negative acknowledgement was received for the transmission of the MAC PDU, the MAC entity determines this transmission corresponds to the last transmission of the MAC PDU for Sidelink resource allocation mode 2. How to determine the last transmission in other cases is up to UE implementation.

1> if *sl-MaxTransNum* corresponding to the highest priority of the logical channel(s) in the MAC PDU has been configured in *sl-CG-MaxTransNumList* for the sidelink grant by RRC and the number of transmissions of the MAC PDU has been reached to *sl-MaxTransNum*; or

1> if a positive acknowledgement to this transmission of the MAC PDU was received according to clause 5.22.1.3.2; or

1> if negative-only acknowledgement was enabled in the SCI and no negative acknowledgement was received for this transmission of the MAC PDU according to clause 5.22.1.3.2:

2> flush the HARQ buffer of the associated Sidelink process.

The transmission of the MAC PDU is prioritized over uplink transmissions of the MAC entity or the other MAC entity if the following conditions are met:

1> if the MAC entity is not able to perform this sidelink transmission simultaneously with all uplink transmissions at the time of the transmission, and

1> if uplink transmission is not prioritized by upper layer according to TS 23.287 [19]; and

1> if *sl-PrioritizationThres* is configured and if the value of the highest priority of logical channel(s) or a MAC CE in the MAC PDU is lower than *sl-PrioritizationThres*.

NOTE 2: If the MAC entity is not able to perform this sidelink transmission simultaneously with all uplink transmissions as specified in clause 5.4.2.2 of TS 36.321 [22] at the time of the transmission, and prioritization-related information is not available prior to the time of this sidelink transmission due to processing time restriction, it is up to UE implementation whether this sidelink transmission is performed.

NEXT OF THE CHANGE

##### 5.22.1.3.2 PSFCH reception

The MAC entity shall for each PSSCH transmission:

1> if an acknowledgement corresponding to the PSSCH transmission in clause 5.22.1.3.1a is obtained from the physical layer:

2> deliver the acknowledgement to the corresponding Sidelink HARQ entity for the Sidelink process;

1> else:

2> deliver a negative acknowledgement to the corresponding Sidelink HARQ entity for the Sidelink process;

1> if the PSSCH transmission occurs for a pair of Source Layer-2 ID and Destination Layer-2 ID corresponding to a PC5-RRC connection which has been established by upper layers:

2> perform the HARQ-Based Sidelink RLF Detection procedure as specified in clause 5.22.1.3.3.

If *sl-PUCCH-Config* is configured by RRC, the MAC entity shall for a PUCCH transmission occasion:

1> if the *timeAlignmentTimer*, associated with the TAG containing the Serving Cell on which the HARQ feedback is to be transmitted, is stopped or expired:

2> not instruct the physical layer to generate acknowledgement(s) of the data in this TB.

1> else if a MAC PDU has been obtained for a sidelink grant associated to the PUCCH transmission occasion in clause 5.22.1.3.1, the MAC entity shall:

2> if the most recent transmission of the MAC PDU was not prioritized as specified in clause 5.22.1.3.1a:

3> instruct the physical layer to signal a negative acknowledgement on the PUCCH according to clause 16.5 of TS 38.213 [6].

2> else if HARQ feedback has been disabled for the MAC PDU and next retransmission(s) of the MAC PDU is not required:

3> instruct the physical layer to signal a positive acknowledgement corresponding to the transmission on the PUCCH according to clause 16.5 of TS 38.213 [6].

2> else if HARQ feedback has been disabled for the MAC PDU and no sidelink grant is available for next retransmission(s) of the MAC PDU (including the case *sl-MaxTransNum* corrersponding to the highest sidelink grant by RRC and the number of transmissions of the MAC PDU has not reached *sl-MaxTransNum* after all PSSCH duration(s) in a *sl-periodCG* for the sidelink grant), if any:

3> instruct the physical layer to signal a negative acknowledgement corresponding to the transmission on the PUCCH according to clause 16.5 of TS 38.213 [6].

2> else:

3> instruct the physical layer to signal an acknowledgement corresponding to the transmission on the PUCCH according to clause 16.5 of TS 38.213 [6]

1> else:

2> instruct the physical layer to signal a positive acknowledgement on the PUCCH according to clause 16.5 of TS 38.213 [6].

END OF THE CHANGE