**3GPP TSG-RAN2 Meeting #124** **R2-231**

**Chicago, USA, 13th – 17th November, 2023**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.321** | **CR** | 1700 | **rev** | **1** | **Current version:** | 17.6.0 |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | Introduction of R18 positioning to MAC spec |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_pos\_enh2-Core |  | ***Date:*** | 2023-11-20 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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)* |
|  |  |
| ***Reason for change:*** | **=================CA POSITIONING===========================**The following issues need to be addresed for CA positioning * **CA#Issue1:** the following agreement has been reached in RAN1 on the SRS transmission with carrier aggregation

|  |
| --- |
| AgreementPositioning SRS bandwidth aggregation is supported for UEs in RRC\_CONNECTED.Positioning SRS bandwidth aggregation is supported for UEs in RRC\_INACTIVE state.For the details, Rel-17 positioning SRS configuration for UE in RRC\_INACTIVE state outside initial UL BWP can be the starting point |

**================CARRIER PHASE POSITIONING================**The following issues need to be addressed for carrier phase positioning * **CPP#Issue1**: In the LS to RAN1 on RAN1-led positioning issues, the following question has been asked regarding the time window for UL-SRS transmission for carrier phase positioning as in R2-2311391

|  |
| --- |
| Carrier phase positioning:* For simultaneous transmission of UL SRS from a target UE and a PRU, is there a need for gNB to indicate the time window(s) directly to UE?
 |

Hence, an FFS is added in a newly created section for SRS transmission in carrier phase positioning.The following has been agreed for CPP positioning in RAN1:

|  |
| --- |
| Q7) For simultaneous transmission of UL SRS from a target UE and a PRU, is there a need for gNB to indicate the time window(s) directly to UE?Answer for Q7) For Q7, there is no such need. |

**===========================LPHAP==========================*** **LPHAP#Issue1**: The following agreements have been made during RAN2#122 regarding area-specific TAT

|  |
| --- |
| Agreements:Define an SRS for positioning validity-area specific TA timer (e.g., with larger values) for a UE in RRC\_INACTIVE state.- The UE starts/restarts the area-specific TA timer when it receives the TA command.- The UE stops the SRS transmission when the area-specific TA timer expires.- The UE stops the area-specific TA timer when it reselects to a cell out of the SRS validity area.- Other stop/restart conditions can be discussed. |

* **LPHAP#Issue2:** The following has been agreed during RAN2#123

|  |
| --- |
| Agreements:The following criterion needs to be defined for the start/re-start of the area-specific TA timer: * Reception of RRCRelease message containing the SRS configuration (excluding pre-configured SRS)
 |

* **LPHAP#Issue3**: During RAN2#123bis, the following has been agreed regarding the stored RSRP update at cell reselection.

|  |
| --- |
| Agreements:Introduce an autonomous TA adjustment enabler in the area-specific SRS configuration. If configured by the network, subject to UE capability, UE autonomously adjusts the stored RSRP when cell-reselection happens. |

======================**REDCAP POSITIONING=================**The following issues need to be addressed for REDCAP positioning * **REDCAP#Issue1**: RAN1 has agreed that positioning SRS frequency hopping can be supported for both RRC\_INACTIVE and RRC\_CONNECTED

|  |
| --- |
| SRS Tx Frequency hopping is supported for both RRC\_CONNECTED and RRC\_INACTIVE state. |

* **REDCAP#Issue2:** The following agreement has been made in RAN1 on the supported time window for REDCAP positoning SRS frequency hopping

|  |
| --- |
| **Agreement**For RedCap UEs positioning transmitting the UL SRS with frequency hopping, regarding the collisions between other UL and DL signals/channels and the UL SRS with frequency hopping, support both of the following options * Option 1: UL time window where the UE is not expected to []transmit other signals/channels and is only expected to transmit FH SRS for positioning.
	+ FFS details of an UL time window
	+ Note: it implies that UE drops the transmission of other signals/channels and transmits SRS for positioning
* Option 2: new collision rules between the UL SRS with frequency hopping and other UL and DL signals/channels/. Option 2 can apply without ~~[~~or outside~~]~~ UL time window (i.e. option 1)
	+ FFS: details on the collision rules

Note: it is understood that option 2 is a component of the feature for UL SRS Tx hopping (FG 41-5-2), and option 1 is a separate feature group.Note: UE is not expected to be configured with a SRS for positioning hopping cycle partially overlapping with UTW. |

On the UTW configuration, the following has been agreed:

|  |
| --- |
| **Agreement**The UL time window for UL SRS for positioning with Tx hopping can be configured to be periodic with configurable starting SFN, slot and symbol number, periodicity, duration* FFS values for starting SFN, slot and symbol number, periodicity and duration

**Agreement**With regards to the configuration of the UTW:* the window parameters for periodicity and starting slot offset have the same candidate values as the periodicity and starting slot offset parameters for the SRS for positioning in the IE *PeriodicityAndOffset*
* the duration of the window in slot is {1,2,4,6} slots
 |

* **REDCAP#Issue3**: In terms of the supported RRC states for REDCAP positoning, the following has been agreed for SRS

|  |
| --- |
| **Agreement**SRS Tx Frequency hopping is supported for both RRC\_CONNECTED and RRC\_INACTIVE state. |

* **REDCAP#Issue4:** RAN1 has agreed on the following on the relationship between the BWP for SRS for frequency hopping and the BWP for data in the reply LS R1-2312434

|  |
| --- |
| From RAN1 perspective, the separate BWP configuration is outside any data BWP configuration. |

====================**SIDELINK POSITIONING=================**The following issues need to be addressed for SIDELINK positioning * **SL#Issue1:** The following agreement has been made in RAN1 on the triggering of resource selection in Scheme2.
	+ Hence, there are two mechanisms for triggering SL-PRS resource in scheme2 applicable for both shared and dedicated resource pool: (a) triggering from the UE’s own higher layers; (b) triggering from another UE by lower layer signaling

|  |
| --- |
| **Agreement**In Scheme 2, with regards to the triggering of SL-PRS, support one or both of the following options: * Option 1: Support SL-PRS triggering at the physical layer by the UE’s own higher layers.
	+ Note: this also includes higher layer triggering from another UE
* Option 2: Support UE-A to request UE-B to transmit SL-PRS via lower layer signaling sent by UE-A.
	+ FFS: Whether lower-layer signaling is SCI or SL MAC-CE

**Agreement**In Scheme 2, with regards to the triggering of SL-PRS, confirm the related WA for shared and dedicated resource pools.* With regards to the lower-layer signalling, support SCI associated with SL-PRS transmission
	+ FFS: whether this is enabled by (pre)configuration
* FFS: to support also SL-PRS

**R1#113****Agreement**In Scheme 2, with regards to the triggering of SL-PRS, confirm the related WA for shared and dedicated resource pools.* With regards to the lower-layer signalling, support SCI associated with SL-PRS transmission
	+ FFS: whether this is enabled by (pre)configuration
	+ FFS: to support also SL-PRS
 |

* **SL#Issue2:** The following agreement has been achieved for SL-PRS in shared RP. There might be impacts to MAC spec in two aspecs
	+ For Scheme1 scheduling, for the current MAC procedure, there is always data when a SCI is received. While for SL-PRS transmission in shared RP, it is possible that data is not transmitted while only SL-PRS is transmitted.
	+ For Scheme2 scheduling, for the current MAC spec, the resource selection is triggered by availability of data for transmission. While this no longer holds for SL-PRS transmission in shared RP without data

|  |
| --- |
| **Agreement**In a shared resource pool, SL-PRS, associated PSCCH and PSSCH scheduled by the PSCCH are included in the same slot:* The PSSCH is used for 2nd SCI and SL-SCH
	+ Note: the UE may not have data available for transmission. Up to RAN2 how to define the specification support for this case.
 |

* **SL#Issue3:** For RA scheme 2 in dedicated resource pool, the following has been agreed in the RAN1#113 meeting.
	+ Priority
	+ Hence, based on this agreement, the reservation periodicity should be selected by the upper layer from the set of (pre-)configured set of values
	+ Also, as indicated in the agreement, re-evaluation and pre-emption for SL-PRS using R16 mechanism is supported as a starting point.

|  |
| --- |
| **RAN1#113****Agreement**For Scheme 2, in a dedicated resource pool, * Multiple L1 SL-PRS priority are allowed in a resource pool
* A SL PRS resource within the resource selection window is used as a candidate resource
* with regards the reservation interval of SL-PRS, it is provided by UE’s higher layers with values TBD. The set of values is (pre-)configured.
	+ Use the periodicities available for legacy SL communication and the ones defined for DL-PRS as a starting point.
* with regards to the resource (re)-selection procedure
	+ support re-evaluation & pre-emption for SL-PRS using the Rel-16 re-evaluation and pre-emption respectively as a starting point.
 |

* **SL#Issue4**: Regarding the cast mode of the SL-PRS tranmsission, the following has been agreed. So, it can be seent that
	+ broadcast/groupcast/unicast can be supported for PRS transmission in all schems and in any SL-PRS resource pool.
	+ Also, the agreement says that the UE can be configured with either RA Scheme1/2, but not both. This means that configured grant and resource allocation Scheme 2 cannot be configured together

|  |
| --- |
| **R1#112****Agreement*** A UE can be configured to perform either resource allocation Scheme 1 or Scheme 2, applicable to all resource pools (dedicated or shared resource pools).
* SL PRS unicast/groupcast/broadcast can occur in either a shared or a dedicated resource pool.
 |

* **SL#Issue5**: The following agreement has been achieved for RA for scheme 1 in RAN1

|  |
| --- |
| **RAN1#112bis****Agreement**For Scheme 1 SL-PRS resource allocation, a transmitting UE can receive a SL-PRS resource allocation signaling from gNB through a* Dynamic grant
	+ FFS Reuse DCI format 3\_0 for signalling SL-PRS resource allocation or Support a new DCI format (3\_X) and consider DCI format 3\_0 as a starting point
* Configured grant type 1
	+ the SL-PRS transmission(s) follows the higher layer configuration
* Configured grant type 2
	+ Support activating and releasing the configured grant using a new DCI format 3\_X or 3\_0 (to be down-selected between the two DCI formats)
* The above mechanisms use NR Rel-16 mode-1 signaling as a starting point
* FFS: whether same/different DCI format(s) are applied for shared pool and dedicated pool.
* FFS: Further details

**Agreement**In dynamic grant type resource allocation in scheme 1,* For shared resource pool, DCI format 3\_0 is being used as a starting point, down-select between the two alternatives below:
	+ Alt. 1: Indication SL-PRS specific information is explicitly included in DCI
		- FFS: Which SL-PRS specific information
	+ Alt. 2: Indication SL-PRS specific information is not explicitly included in DCI
* FFS: Dedicated resource pool
 |

* **SL#Issue6:** For the mode of resource allocation, the following has been agreed in RAN1. It can be seen that Partial sensing not supported and any combination of selection based on sensing or random selection are supported

|  |
| --- |
| **RAN1#112****Agreement**Confirm the working assumption: Sensing-based and random selection can be allowed in the same resource pool.* Note: It is possible to (pre-)configure a resource pool to exclusively use sensing-based resource allocation.

**Agreement**For the scheme 2 sensing-based resource allocation: * Alt. 2: Rel-16 resource (re)-selection procedure with periodic and without periodic reservations is the starting point for the design of SL-PRS in the dedicated resource pool.

Note: This means that Rel-17 partial sensing is not considered a starting point for the design |

* **SL#Issue7:** For one-shot or periodic resource reservation, RAN1 has agreed on the following. Hence, both periodic and without periodic reservations are supported

|  |
| --- |
| **Agreement**For SL-PRS transmission, at least support the following* **SL-PRS transmissions with periodic reservation:** SL-PRS transmissions which are being reserved with a similar mechanism as the SL periodic resource reservation for another TB in legacy SL communication
	+ FFS: whether/what changes are needed
* **SL-PRS transmissions without periodic reservation**: SL-PRS transmissions in which the SL-PRS is transmitted at least once without periodic reservation, with a similar mechanism as in legacy SL communication with SL resource without periodic reservation.
	+ FFS: Maximum number of reservations and transmissions after triggering
 |

* **SL#Issue8:** The following agreement has been reached regardin IUC

|  |
| --- |
| **Agreement**For the shared resource pool, reuse the existing IUC signaling of both Scheme 1 and Scheme 2.* SL-PRS transmissions are treated as any other legacy transmission for SL communication when considering IUC information exchanges.

**Conclusion**For Rel-18 sidelink positioning:* For the dedicated resource pool, IUC signalling is not supported
* Do not support that a UE can reserve a SL-PRS resource for the transmission of another UE
 |

* **SL#Issue9:** voided
* **SL#Issue10**: obviated by issue 23
* **SL#Issue11:** For dedicated resource pool, the following has been agreed. Hence, a PSCCH is followed by SL-PRS and there is no PSSCH

|  |
| --- |
| **Agreement**For a dedicated resource pool for SL positioning, only a single stage SCI is used. PSCCH and associated SL-PRS are TDMed in the same slot.* FFS: whether SL-PRS can be transmitted in a slot without associated PSCCH

**RAN1#113****Agreement**For a dedicated resource pool for SL positioning, SL-PRS cannot be transmitted in a slot without associated PSCCH.**Agreement**PSSCH is not included in dedicated resource pool for SL positioning. |

* **SL#Issue12:** reagrding the SCI format, the following has been agreed that a new SCI format will be defined for the 2nd stage SCI for SCI trnasmision in shared RP.

|  |
| --- |
| **R1#113****Agreement**With regards to the SCI signaling in a shared resource pool, * Support a new format for 2nd stage SCI.
	+ FFS how to indicate the new 2nd stage SCI format
* FFS: If a 2nd stage SCI indicates both SL-PRS and SL-SCH, the cast type, destination ID, source ID are shared.
 |

* **SL#Issue13:** The following has been agreed during RAN1#114 regarding the fields on the 2nd stage SCI for SL-PRS transmission on shared RP. With this agreement, the SL-PRS information on shared resource pool is the same as the legacy Sidelink Transmission Information. This can be reflected in the definition of the wording

|  |
| --- |
| **R1#114****Agreement**In a shared resource pool, with regards to the fields in SCI format 2-D, include the following fields: * SL PRS resource information indication of the current slot – ceiling(log2(#SL-PRS resources (pre-)configured in the resource pool) bits)
* SL PRS request – 0 or 1 bit
* Embedded SCI format – [X] bit(s)
	+ If the “Embedded SCI format” field is set to [0], the SCI 2-A fields are included with necessary padding
	+ If the “Embedded SCI format” field is set to [1], the SCI 2-B fields are included
 |

* **SL#Issue14:** RAN1 has agreed on the following for the parameters on dedicated resource pool that should be indicated to the lower layer

|  |
| --- |
| **R1#114****Agreement**For Scheme 2, in dedicated resource pools, with regards to the procedure for determining the subset of resources to be reported to higher layers, when triggering the resource (re-)selection procedure, the higher layers provide the following parameters for candidate SL-PRS transmission(s):* resource pool from which to report SL-PRS resources
* Priority
* Delay budget
* Reservation period
* List of resources for pre-emption and re-evaluation
* Set of SL-PRS resource ID (s) which can include all (pre-)configured SL-PRS resource IDs
 |

* **SL#Issue15:** The following has been agreed on the CBR measurment/priority and their relationship with parameters. It can be seen that (a) when the selected pool is shared resource pool, the legacy restrictions applies; while (b) when the selected pool is dedicated resource pool, the new restrictions apply.

|  |
| --- |
| **R1#114****Agreement**In Scheme 2, * For a dedicated resource pool for positioning,
	+ congestion control can restrict at least the following range of parameters for SL PRS configuration per resource pool by CBR and priority:
		- Maximum SL PRS transmission power
		- Maximum Number of SL PRS (re-)transmissions
		- Discuss further the following four SL PRS transmission parameters:
			* Minimum Periodicity of SL PRS
			* Maximum Number of SL PRS resources in a slot
			* Maximum comb-size of a SL PRS resource in a slot
			* Maximum Number of OFDM symbols of a SL PRS resource in a slot
	+ For congestion control similar to legacy, the CR limits are (pre)-configured per priority in a resource pool
		- Note: Similar to SL communication how to achieve the CR limit is left to UE implementation.
* For a shared resource pool for positioning, the SL PRS can share the same restriction of PSSCH without specific enhancement in addition to what is already specified.
 |

* **SL#Issue16:** With resource allocation scheme 1, the following has been agreed during RAN2#123:

|  |
| --- |
| **R2#123****Agreement**When aperiodic/one-shot SL-PRS transmission is triggered for UE configured with Scheme 1 SL-PRS resource allocation, at least for the case when LMF is not involved in giving the grant, design a new MAC CE for the UE to send to the gNB for SL-PRS resource request. At least when periodic SL-PRS transmission is triggered for UE configured with Scheme 1 SL-PRS resource allocation, at least for the case when LMF is not involved in giving the grant, the UE sends an RRC message to the gNB for providing the assistance information for CG configuration.  |

* **SL#Issue17:** On the SL-PRS priority levels, the following have been agreed by RAN2:

|  |
| --- |
| **R2#123****Agreement**Define 8 priority levels for SL-PRS priority, same as the number of priority levels for SL-SCH. Send a LS to RAN1 and SA2 on RAN2 agreement with the understanding that the SL-PRS priority levels are mapped from sidelink positioning/ranging QoS. The SL-PRS priority can be provided by the UE’s own high layer when it triggers the SL-PRS transmission. |

* **SL#Issue18:** RAN1 has agreed on the following list of parameters for CG type 1

|  |
| --- |
| **R1#114****Agreement**In resource allocation in scheme 1, for a dedicated resource pool* For configured grant type 1 resource allocation,
	+ RRC is used for indicating at least the following:
		- Info-1: the periodicity,
		- Info-2: the slot offset relative to a logical slot defined by Info-3,
		- Info-3: SFN used for determination of the slot offset,
		- Info-4: Resource pool index
		- Info-5: Time resource assignment for SL-PRS future reservation(s)
		- Info-6: SL-PRS resource ID (s) for the future 1 or 2 reservations
		- Info-7: SL-PRS resource ID for the first SL-PRS transmission
 |

* **SL#Issue19:** Voided
* **SL#Issue20:** The following has been agreed in RAN1 for resource allocation scheme 1 on dedicated resource pool for DG

|  |
| --- |
| **R1#114****Agreement*** in the DCI, introduce at least the following fields:
	+ Resource pool index – number of bits same to SL communications
	+ Time gap - 3 bits
	+ SCI format 1-B fields:
		- Time resource assignment for SL-PRS future reservation(s)
		- SL-PRS resource ID (s) for the future 1 or 2 reservations
	+ SL-PRS resource ID for the first SL-PRS transmission
	+ Configuration index – number of bits same to SL communications
	+ Padding bits, if required
 |

* **SL#Issue21**: The following has been agreed in RAN1 regard the issue of PDB for SL-PRS. Hence, within the RAN2 spec, the “PDB” needs to be substitued with “Delay Budget for SL-PRS”

|  |
| --- |
| **R1#114**Working assumptionFor Scheme 2, in a dedicated resource pool, using Rel-16 resource (re)-selection procedure as the starting point, support the following modification:* **Modification 2:** For the resource selection window:
	+ Option 1: for the derivation of the window, using the legacy approach as a starting point, substitute the Packet Delay Budget (PDB) with a Delay Budget for SL-PRS

Send an LS to RAN2 asking RAN2 whether they can confirm RAN1’s working assumption, and if not let RAN2 decide an alternative solution. |

* **SL#Issue22:** For dedicated RP, the SL-PRS bandwidth is the same as that of the resource pool. For shared RP, the SL-PRS bandwidth is the same as that of PSSCH

|  |
| --- |
| **R1#114****Conclusion**For a dedicated resource pool, only the case where SL PRS bandwidth is the same as resource pool bandwidth is supported in Rel-18.**Agreement**For a shared resource pool, SL PRS bandwidth is same as the bandwidth indicated for PSSCH. |

* **SL#Issue23:** SCI on dedicated resource pool can also indicate the retrnasmission resources for SL-PRS

|  |
| --- |
| **R1#114****Agreement**In the dedicated resource pool for positioning, with regards to the SCI for SL-PRS, information carried in SCI for SL-PRS should at least include:* Field 1: SL-PRS priority - 3 bits
* Field 2: Source ID – Up to resource pool (pre-)configuration 12 or 24 bits
* Field 3: Destination ID - 24 bits
* Field 4: Cast type – 2 bits
* Field 5: Resource reservation period - Ceil(log2(Number of candidate values in (pre-)configuration))
* Alt. 5.1: Up to 16 values
* Field 6: Time resource assignment for SL-PRS future reservations
* 1 or 2 max future slots within 32 slots – 5 bits or 9 bits, based on the maximum number of the (pre-)configured future reservations
* Field 7: SL-PRS resource ID (s) for the future 1 or 2 reservations
* Number of bits:
	+ In case of max number of future reservations is (pre-)configured to 2: [2\*Ceil(log2(Number of SL-PRS resources in (pre-)configuration))]
	+ In case of max number of future reservations is (pre-)configured to 1: Ceil(log2(Number of SL-PRS resources in (pre-)configuration))
* Field 8: SL-PRS request – 0 or 1 bit
* Field 9: Reserved bits – up to (pre-)configuration
 |

* **SL#Issue24**: RAN2 agreed on the following on the contents of the MAC CE for SL-PRS resource request

|  |
| --- |
| **R2#123bis****Agreement**Support the following at least the following contents within the MAC CE for SL-PRS resource request: FFS whether both of them can be items with a list Destination ID (indicated by an index rather than the complete destination ID) Priority |

* **SL#Issue25:** RAN2 agreed on the following for the transmission of SR for SL-PRS resource request MAC CE and the cancellation of the SR

|  |
| --- |
| **R2#123bis****Agreement**When UL-SCH resource cannot accommodate SL-PRS resource request MAC CE plus its subheader, the UE should send SR to the gNB, either by SR-PUCCH or SR-PRACH.SR triggered by the SL-PRS resource request MAC CE is cancelled when the MAC CE is transmitted. FFS the other conditions to cancel the SR. |

* **SL#Issue26:** On the cancellation of the MAC CE for SL-PRS resource request, RAN2 has agreed that

|  |
| --- |
| **R2#123bis****Agreement**SL-PRS resource request MAC CE is cancelled when the MAC CE is transmitted. FFS the other conditions to cancel the MAC CE. |

* **SL#Issue27:** On the CG configmration MAC CE, it was agreed that

|  |
| --- |
| **R2#123bis****Agreement**CG confirmation MAC CE is needed when the DCI for CG type 2 activation/deactivation command is successfully received. |

* **SL#Issue28**: on the resource pool selection for SL-PRS, RAN2 has agreed that

|  |
| --- |
| **R2#123bis****Agreement**Leave the resource pool selection to UE implementation among resource pools allowing SL-PRS transmission when resource selection is triggered for SL-PRS transmission.When resource selection is triggered for SL-LCH data transmission, dedicated pool should not be selected. |

* **SL#Issue29:** The following has been agreed regarding the conditions for resource selection/reselection

|  |
| --- |
| **R2#123bis****Agreement**Legacy conditions for resource selection/reselection check can be reused when the shared pool is selected. Legacy conditions for resource selection/reselection can be the baseline when the dedicated pool is selected. The following two conditions are not applicable for the conditions for resource selection/reselection for dedicated resource pool. * if PSCCH duration(s) and 2nd stage SCI on PSSCH for all transmissions of a MAC PDU of any selected sidelink grant(s) are not in SL DRX Active time as specified in clause 5.28.3 of the destination that has data to be sent.
* 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
* If the transmission with the selected grant cannot fulfill the remaining SL-PRS delay budget, resource selection/reselection is performed.
 |

* **SL#Issue30**: the following has been agreed regarding what is selected during resource selection/reselection for shared/dedicated resource pool

|  |
| --- |
| **R2#123bis****Agreement**The following legacy parameters are selected/reselected when the TX resource (re-)selection is triggered in the shared resource pool. (a) Resource reservation interval, when the transmission of periodic SL-PRS(b) COUNTER value, when the transmission of periodic SL-PRS(c) Number of HARQ retransmissions(d) frequency resources within the rangeThe following parameters are selected/reselected when the TX resource (re-)selection is triggered in the dedicated resource pool. FFS the number of retransmissions.(a) resource reservation interval, when the transmission of periodic SL-PRS(b) COUNTER value, when the transmission of periodic SL-PRS |

In addition to the agreement above, RAN1 has also agreed on the selection of number of retransmissions for dedicated resource pool.

|  |
| --- |
| **R1#114bis****Agreement**For SL-PRS transmissions without periodic reservation, the maximum number of reservations signaled in an SCI is * (pre-)configurable with a value of 2 or 3, which is similar with Rel-16 sidelink.
* This is applicable to both shared and dedicated resource pool and both scheme 1 and scheme 2
 |

Thus, the FFS in the RAN2 agreement above is not needed. That RAN1 has already agreed on the number of retransmissions needs to be selected for dedicared resource pool* **SL#Issue31**: The following agreement has been made for the L1 priority with SL-PRS transmission in RAN2

|  |
| --- |
| **R2#123bis****Agreement**When resource selection is triggered for the transmission of both data and SL-PRS on shared resource pool, the priority is determined by MAC as the higher priority of the two for the usage of both MAC and PHY. Send a reply LS to RAN1The priority of the data should follow the priority of PRS when there is only SL-PRS pending for transmission on shared resource pool. |

* **SL#Issue32:** RAN2 has agreed the following for the destination ID selection in the LCP procedure for SL transmission:

|  |
| --- |
| **R2#123bis****Agreement**For a SL grant in dedicated resource pool, MAC layer selects the destination that has the highest priority of the SL PRS for transmission. FFS the other criteria for destination selection in shared resource poolFor a SL Grant in shared resource pool, MAC layer selects the destination with the highest priority of the SL-PRS and SL-SCH data. FFS the other criteria for destination selection in shared resource pool |

* **SL#Issue33**: RAN2 has agreed on the following for the allocation of sidelink resources in shared resource pool in the LCP procedure for SL transmission

|  |
| --- |
| **R2#123bis****Agreement**When the destination of the shared resource pool is already selected when there are both SL-PRS and data pending for transmission, SL PRS is transmitted when there is remaining resources for SL-PRS after the SL-SCH with higher priority has already been allocated; if there is no higher priority data, SL-PRS can be transmitted.If a SL PRS is transmitted in the SL grant in the shared pool, legacy LCP rules can be performed to construct MAC PDU associated with the SL grant after TBS is provided from PHY. |

* **SL#Issue34:** The following has been agreed regarding the relation between DRX and dedicated resource pool

|  |
| --- |
| **R2#123bis****Agreement**DRX and dedicated resource pool for PRS transmission should not be applied together |

* **SL#Issue35:** The following agreement has been made regarding the MAC PDU generation SL-PRS shared resource pool

|  |
| --- |
| **R2#123bis****Agreement**If the selected destination only has pending SL PRS, the MAC entity should generate MAC PDU containing only padding MAC subPDU for the transmission along with SL-PRS. |

* **SL#Issue36:** On the prioritization of SL-PRS over Uu transmission, the following has been agreed in RAN2

|  |
| --- |
| **R2#123bis****Agreement**SL-PRS is prioritized over PUSCH/PUCCH when  The value of the priority of PUSCH/PUCCH is higher than a threshold, as in legacy The value of the priority of SL-PRS is lower than a threshold |

During RAN2#124, the following has been agreed on the prioritization of uplink over sidelink

|  |
| --- |
| RAN2#124AgreementUplink transmission can be considered as prioritized when uplink cannot be transmitted together with sidelink and none of the V2X sidelink communications or NR sidelink communications or sidelink PRS transmissions are prioritized. |

* **SL#Issue37**: RAN1 has agreed using new RNTI for DG and CG activation/deactivation for SL-PRS on dedicated resource pool

|  |
| --- |
| **R1#114bis****Agreement**In scheme 1, with regards to distinguishing between DCI format 3\_0 and 3\_2: * New RNTIs, i.e., SL-PRS-RNTI & SL-PRS-CS-RNTI, are introduced.
* Support DCI size alignment between DCI format 3\_0, 3\_1 and 3\_2.
 |

* **SL#Issue38**: the following has been agreed on the activation/deactivation of CG type2 in RAN1

|  |
| --- |
| **R1#114bis****Agreement**For activation and deactivation of configured grant type 2 for SL PRS for DCI 3-2, use a dedicated field of size 1 bit.  |

* **SL#Issue39**: The following has been agreed on the prioritization of SR with SL-PRS

|  |
| --- |
| **RAN2#124**AgreementsThe prioritization between SR triggered by UL-SCH and SL-PRS shall follow the same principle as that between UL-SCH and SL-SCH, i.e. based on configured UL/SL prioritization thresholds.The prioritization between SR triggered by SL-SCH and SL-PRS shall be based on direct comparison between the SL priority for SL-PRS and the SL logical channel that triggered the SR. |

* **SL#Issue40**: The following has been agreed on the conditions for MAC CE cancellation

|  |
| --- |
| **RAN2#124**AgreementReuse the legacy threshold for SL communications for SL-PRS prioritization.SL-PRS resource request MAC CE: May be cancelled when SL grant can accommodate all the pending SL-PRS transmission. Shall be cancelled when a MAC PDU is transmitted and this MAC PDU contains SL-PRS resource request MAC CE that indicates all the pending |

 * **SL#Issue41**: The following has been agreed on the conditions for SR cancellation

|  |
| --- |
| **RAN2#124**AgreementSL-PRS to be transmitted since the last event the MAC CE is triggered.Triggered SR shall be cancelled  when SL grant can accommodate all the pending SL-PRS transmission. when a MAC PDU is transmitted and this MAC PDU contains SL-PRS resource request MAC CE that indicates all the pending SL-PRS to be transmitted since the last event the MAC CE is triggered. |

* **SL#Issue42**: The following has been agreed on mechanism for resource reselecion based on counter

|  |
| --- |
| **RAN2#124**AgreementReuse the legacy counter mechanism for SL-PRS transmission, i.e., the counter is maintained per SL process. This applies for both shared and dedicated pool. |

* **SL#Issue43**: The following has been agreed on format of the SL-PRS request MAC CE

|  |
| --- |
| **RAN2#124**AgreementSL-PRS resource request MAC CE includes at least a list of (destination, priority). |

* **SL#Issue44**: The following has been agreed on the retransmission in RAN1 and RAN2

|  |
| --- |
| **RAN2#124**AgreementImplement support for retransmission on dedicated resource pool.**RAN1#115****Conclusion**With regards to the SL PRS (re)transmission(s):* RAN1 assumes that higher layers may provide to PHY layer more than one SL-PRS resource(s), which are used for the (re-)transmission of multiple SL-PRS(s) on different slots to the same target UE(s)
	+ It is up to RAN2 to specify a mechanism for selection of multiple resources for SL-PRS

**Conclusion**“Maximum Number of SL PRS (re-)transmissions” parameter is applicable to SL-PRS resource (re)-selection. |

* **SL#Issue45**: The following has been agreed on parameter of the time window MAC indicates to PHY

|  |
| --- |
| **RAN2#124**AgreementWhen there are both SL-PRS and SL-SCH data pending for transmission at resource selection, the resource selection should be within the smaller one of the SL-PRS delay budget of the pending SL-PRSs and PDB of the logical channels. |

* **SL#Issue46**: on the non-functional aspects for SL positioning, the following has been agreed

|  |
| --- |
| RAN2#124Agreement* Revisit the formula for determining CG occasion when the RRC configuration is fully determined
* There can be zero or one SR configuration for SL-PRS resource request MAC CE
* At most one PUCCH resource for SR is configured for SL-PRS resource request MAC CE.
* Come back to this issue of determining the number of SL-PRS retransmission when the signaling details, i.e, the RRC configurations and L1 parameters are completed
* At SCI reception, the source ID in SCI for SL-PRS dedicated resource pool when configured as 12 bit is the 12 LSB of the destination ID of the peer UE.
* The number of bits for destination ID is 5 bits, the same as in legacy SL-BSR and the number of bits for priority is 3 bits.
* eLCID is adopted for SL-PRS request MAC CE.
* SL-PRS’s priority is on the same level as data from STCH and lower than SCI reporting MAC CE, Sidelink Inter-UE Coordination Request MAC CE and Sidelink Inter-UE Coordination Information MAC CE, Sidelink DRX Command MAC CE and data from SCCH.
 |

======UPDATE AFTER RAN2#123BIS FOR PREIVOUS ISSUES=======* **SL#Issue0:** On the terminology, RAN1 has agreed during RAN1#114bis that the wording would be "dedicated SL-PRS resource pool" and "shared SL-PRS resource pool". The same wording can be adopted throughout the running MAC CR as well.

|  |
| --- |
| **R1#114bis****Agreement**With regards to the dedicated resource pool for positioning, suggest to the editors to align the terminology used as:* “Dedicated SL PRS resource pool” defined in 38.214 as shown below:
	+ A sidelink resource pool which can be used for transmission of SL PRS and cannot be used for transmission of PSSCH will be referred to as dedicated SL PRS resource pool.

**Agreement**With regards to the shared resource pool for positioning, suggest to the editors to align the terminology used as:* “shared SL PRS resource pool” defined in 38.214 as shown below:

A sidelink resource pool which can be used for transmission of both SL PRS and PSSCH will be referred to as shared SL PRS resource pool. |

* **SL#Issue21:** During RAN2#123bis, RAN2 has confirmed on the working assumption from RAN1 on SL-PRS delay budget, as in reply LS R2-2311398
* **SL#Issue23:** In the RAN1 parameter list, it has been added that there is a configuration for whether the source ID is 12 bits or 24 bits. Change needs to be made for the Tx UE behavior for transmitting SCI up to the RRC configuration
 |
|  |  |
| ***Summary of change:*** | ***The following changes have been applied for CA positioning**** **CA#Change0:** Give a definition for positoning SRS bandwidth aggregation
* **CA#Change1:** Add support of positioning SRS banwdith aggregation for RRC\_INACTIVE

***The following changes have been applied for carrier phase positioning**** **CPP#Change1**: Add a new section for SRS transmission in carrier phase positioning

***The following changes have been applied for LPHAP**** **LPHAP#Change1**: Introduce an area-specific time alignment timer
* **LPHAP#Change1a**: For the section maintenance of uplink time alignment, the UE starts the area-specific TAT when TA command is received when validity area is configured for SRS
* **LPHAP#Change1b**: When transmitting SRS with validity area, validity condition has to be satisfied and the validity condition includes running area-specific TAT
* **LPHAP#Change1c**: when cell selection/reselection happens out of a validity area, the RRC layer should indicate to MAC to stop the area-specific TAT
* **LPHAP#Change2**: the condition for the UE to start/re-start the area-specific TAT is added
* **LPHAP#Change3**: add how stored RSRP is updated when validity area is configured

***The following changes have been applied for REDCAP positioning**** **REDCAP#Change0:** Genral introduction of the feature to MAC spec including the definition of "SRS TX frequency hopping" and etc.
* **REDCAP#Change1:** support positioning SRS frequency hopping for positioning SRS transmission in RRC\_INACTIVE.
* **REDCAP#Change2:** uplink time window for SRS transmission needs to be specified in the MAC spec
* **REDCAP#Change3:** SRS Tx frequncey hopping can be supported for both RRC\_CONNECTED and RRC\_INACTIVE.
* **REDCAP#Change4:** BWP operations for SRS Rx frequency hopping is introduced

***The following changes have been applied for sidelink positioning**** **SL#Change0:** Generic changes made for the introduction of the feature
* **SL#Change1:** The triggering of resource selection is by UE’s own higher layer and lower layer signaling
* **SL#Change2:** The SL-PRS transmission can be transmitted without data
* **SL#Change3:** For dedicated RP, L1 SL-PRS priority is needed
* **SL#Change3a:** Reservation period is provided by the higher layer and selected from a pre-configured set of values
* **SL#Change3b:** Re-evaluation and pre-emption are supported
* **SL#Change4:** All cast modes are supported for SL-PRS transmissions in all the schemes and resource pool.
* **SL#Change5a:** The SL-PRS occasion can be obtained by the UE in DG, CG type 1 and CG type 2
* **SL#Change5b:** Configured grant type 2 activation/deactivation
* **SL#Change6:** full sensing and random-selection can be supported for resource allocation mode 2; while partial sensing is not supported
* **SL#Change7:** Both periodic and aperiodic reservation are supported for Scheme2.
* **SL#Change8:** IUC is supported for SL-PRS transmission on shared RP, but not supported for dedicated RP
* **SL#Change9:** voided
* **SL#Change10:** SCI for SL-PRS transmission on dedicated resource pool
* **SL#Change11**: For both shared and dedicated resource pool, both PSSCH and SL-PRS are transmitted. For SL-PRS on dedicated resource pool, PSSCH is not transmitted
* **SL#Change12**: A new SCI format will be defiend for 2nd stage SCI transmission on shared resource pool. FFS the content of the SCI
* **SL#Chagne13:** Add SL-PRS in the definition of *Sidelink trasnmission information* for SL-PRS transmission information on shared resource pool
* **SL#Change14:** List of parameters that the higher layer indicates to the lower layer
* **SL#Change15**: MAC parameter selection based on CBR and priority
* **SL#Change16:** SL-PRS resource request. Add new MAC CE for SL-PRS resource
* **SL#Change17:** SL-PRS priority in the SCI for dedicated resource pool
* **SL#Change18:** Sidelink configured grant configuration parameters
* **SL#Change19:** Voided
* **SL#Change20:** For SL grant reception, add the determination of SL grant based on DCI on dedicated resource pool
* **SL#Change21:** Add SL-PRS delay budget to the spec
* **SL#Change22**: Selection of BW for resource allocation Scheme 2
* **SL#Change23**: SCI fields for SL transmission and also on the SL-PRS transmission information
* **SL#Change24:** The fields of the SL-PRS resource request MAC CE are added
* **SL#Change25:** introduce SR mechanism for the SL-PRS resource reuqest MAC CE
* **SL#Change26:** cancellation of the SL-PRS resource request MAC CE
* **SL#Chagne27:** MAC shall trigger CG confirmation MAC CE when DCI for type2 CG activaiton/deactivation is successfully received
* **SL#Change28**: A NOTE is added for the resource pool selection for SL-PRS transmission
* **SL#Change29**: The conditions for resource selection/reselection for dedicated/shared resource pool
* **SL#Change30:** What parameters are selected for shared/dedicated resource pool during resource selection/reselection
* **SL#Change31**: Add how the priority is determiend in SCI
* **SL#Change32:** Implement the changes related to destination ID selection in the LCP procedure
* **SL#Change33:** implement the changes related to resource allocation in the LCP procedure
* **SL#Change34:** clarify that DRX and operations on SL-PRS dedicated pool cannot be applied together.
* **SL#Change35:** change the current LCP procedure that the MAC PDU can also be genearted with zero MAC SDUs if it is sent with SL-PRS on SL-PRS shared resource pool.
* **SL#Change36**: the prioritization between Uu and PC5 transmissions is specified. Also, add SL-PRS transmission to the definition of NR sidelink transmission.
* **SL#Change37**: Introduction of new RNTIs, SL-PRS-RNTI and SL-PRS-CS-RNTI.
* **SL#Change38:** The activation/deactivation of CG type2.
* **SL#Change39:** Prioritization of SR over SL-PRS is added
* **SL#Change40:** Add the conditions for SL-PRS request MAC CE cancellation
* **SL#Change41:** Add the conditions for the triggered SR cancellation
* **SL#Change42:** Follow the legacy mechanism of resource reselection counter
* **SL#Change43:** Add figure for the format of the MAC CE for SL-PRS resource request
* **SL#Change44:** implement on the agreement on retransmission on dedicated resource pool
* **SL#Change45:** Resource selection window for SL-PRS shared resource pool
* **SL#Change46:** Implement the agreements on the nonfunctional aspects of SL positioning.
 |
|  |  |
| ***Consequences if not approved:*** | R18 positioning cannot be supported in MAC spec |
|  |  |
| ***Clauses affected:*** | 2, 3.1, 3.2, 5.2, 5.4.4, 5.8.3, 5.15.1, 5.15.2, 5.22.1, 5.22.1.1, 5.22.1.2, 5.22.1.2a, 5.22.1.2b, 5.22.1.3, 5.22.1.3.1, 5.22.1.3.1a, 5.22.1.3.2, 5.22.1.3.xx, 5.22.1.3.xxa, 5.22.1.4.1, 5.22.1.4.1.2, 5.22.1.4.1.3, 5.22.1.4.2, 5.22.1.5, 5.22.1.xx, 5.22.2, 5.22.2.1, 5.22.2.2.1,5.22.2.2.2, 5.22.2.x, 5.26, 5.28, 5.xx, 6.1.3.xx, 6.2.1, 7.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  |

|  |
| --- |
| TS 37.340 CR 0371TS 37.355 CR 0481TS 38.300 CR 0722TS 38.304 CR 0358TS 38.305 CR 0150TS 38.306 CR [TBD]TS 38.331 CR 4454 |
| TS 38.455 |
|  |

 |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Ver0 in RAN2#124: R2-2312256Ver1 in RAN2#124: R2-231 |

====================================CHANGE BEGINS===================================

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.300: "NR; Overall description; Stage 2".

[3] 3GPP TS 38.322: "NR; Radio Link Control (RLC) protocol specification".

[4] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) protocol specification".

[5] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[6] 3GPP TS 38.213: "NR; Physical Layer Procedures for control".

[7] 3GPP TS 38.214: "NR; Physical Layer Procedures for data".

[8] 3GPP TS 38.211: "NR; Physical channels and modulation".

[9] 3GPP TS 38.212: "NR; Multiplexing and channel coding".

[10] Void.

[11] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

[12] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

[13] 3GPP TS 26.114: "Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[14] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[15] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[16] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[17] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer Procedures".

[18] 3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access".

[19] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services ".

[20] 3GPP TS 23.285: "Architecture enhancements for V2X services".

[21] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[22] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC); Protocol specification".

[23] 3GPP TS 37.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

[24] 3GPP TS 38.215: "NR; Physical layer measurements".

[25] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".

[26] 3GPP TS 23.304: "Proximity based Services (ProSe) in the 5G System (5GS)".

[27] 3GPP TS 38.473: "NG-RAN; F1 Application Protocol (F1AP)".

[28] 3GPP TS 24.587: " Technical Specification Group Core Network and Terminals; Vehicle-to-Everything (V2X) services in 5G System (5GS)".

[29] 3GPP TS 24.554: "Technical Specification Group Core Network and Terminals; Proximity-services (ProSe) in 5G System (5GS) protocol".

[xx] 3GPP TS 23.586: "Technical Specification Group Services and System Aspects; Architectural Enhancements to support Ranging based services and Sidelink Positioning".

===================================NEXT CHANGE=====================================

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**BWP for SRS for positioning Tx frequency hopping:** For SRS for positioning Tx frequency hopping, separate BWP configuration outside BWP configuration for data transmission.

**Dormant BWP:** The dormant BWP is one of downlink BWPs configured by the network via dedicated RRC signaling. In the dormant BWP, the UE stop monitoring PDCCH on/for the SCell, but continues performing CSI measurements, Automatic Gain Control (AGC) and beam management, if configured.

**DRX group:** A group of Serving Cells that is configured by RRC and that have the same DRX Active Time.

**HARQ information:** HARQ information for DL-SCH, for UL-SCH, or for SL-SCH transmissions consists of New Data Indicator (NDI), Transport Block Size (TBS), Redundancy Version (RV), and HARQ process ID.

**IAB-donor:** gNB that provides network access to UEs via a network of backhaul and access links.

**IAB-node:** RAN node that supports NR access links to UEs and NR backhaul links to parent nodes and child nodes.

**Listen Before Talk**: A procedure according to which transmissions are not performed if the channel is identified as being occupied, see TS 37.213 [18].

**Msg3**: Message transmitted on UL-SCH containing a C-RNTI MAC CE or CCCH SDU, submitted from upper layer and associated with the UE Contention Resolution Identity, as part of a Random Access procedure.

**Non-terrestrial network:** An NG-RAN consisting of gNBs, which provide non-terrestrial NR access to UEs by means of an NTN payload embarked on an airborne or space-borne NTN vehicle and an NTN Gateway.

**NR backhaul link:** NR link used for backhauling between an IAB-node and an IAB-donor, and between IAB-nodes in case of a multi-hop backhauling.

**NR sidelink communication**: AS functionality enabling at least V2X Communication as defined in TS 23.287 [19] and ProSe communication (including ProSe non-Relay and UE-to-Network Relay communication) as defined in TS 23.304 [26], between two or more nearby UEs, using NR technology but not traversing any network node.

**NR sidelink discovery**: AS functionality enabling ProSe non-Relay discovery and ProSe UE-to-Network Relay discovery for Proximity based Services as defined in TS 23.304 [26], between two or more nearby UEs, using NR technology but not traversing any network node.

**NR sidelink transmission**: Any NR Sidelink-based transmission, including transmission for NR sidelink discovery, transmission for NR sidelink communication and transmission of SL-PRS.

**PDCCH occasion**: A time duration (i.e. one or a consecutive number of symbols) during which the MAC entity is configured to monitor the PDCCH.

**Positioning SRS Bandwidth Aggregation:** Transmission of positioning SRS on multiple carriers in RRC\_CONNECTED and RRC\_INACTIVE where the positioning SRS resources are linked in RRC configuration as defined in TS 38.331 [5].

**PRS Processing Window**: A time window during which UE may perform PRS measurement inside the active DL BWP with the same numerology as the active DL BWP without measurement gap.

**Ranging/Sidelink Positioning:** AS functionality enabling ranging-based services and sidelink positioning as specified in TS 23.586 [xx].

**RedCap UE:** A UE with reduced capabilities as specified in clause 4.2.21.1 in TS 38.306 [25].

**Serving Cell:** A PCell, a PSCell, or an SCell in TS 38.331 [5].

**Sidelink transmission information:** Sidelink transmission information included in an SCI for an SL-SCH transmission or SL-PRS transmission with or without SL-SCH transmission on SL-PRS shared resource pool as specified in clause 8.3 and 8.4 of TS 38.212 [9] consists of Sidelink HARQ information including NDI, RV, Sidelink process ID, HARQ feedback enabled/disabled indicator, Sidelink identification information including cast type indicator, Source Layer-1 ID and Destination Layer-1 ID, and Sidelink other information including CSI request, SL-PRS request, SL-PRS resource ID, a priority, a communication range requirement and Zone ID.

**SL-PRS dedicated resource pool:** A sidelink resource pool which can be used for the transmission of SL-PRS and cannot be used for the transmission of PSSCH.

**SL-PRS shared resource pool:** A sidelink resource pool which can be used for the transmission of both SL-PRS and PSSCH.

**SL-PRS transmission information on SL-PRS dedicated resource pool:** SL-PRS transmission information on SL-PRS dedicated resource pool is included in an SCI for an SL-PRS transmission on SL-PRS dedicated resource pool, as specified in TS 38.212 [9], consisting of

- SL-PRS identification information, including cast type indicator, source ID and destination ID;

- SL-PRS transmission other information, including SL-PRS priority, SL-PRS request, SL-PRS resource ID and resource reservation period.

**SRS for positioning Tx frequency hopping:** Transmit frequency hopping of positioning SRS in RRC\_INACTIVE and RRC\_CONNECTED.

**SRS positioning validity area:** An area consisting of a list of cells within which the corresponding positioning SRS configuration is considered as valid.

**Special Cell:** For Dual Connectivity operation the term Special Cell refers to the PCell of the MCG or the PSCell of the SCG depending on if the MAC entity is associated to the MCG or the SCG, respectively. Otherwise the term Special Cell refers to the PCell. A Special Cell supports PUCCH transmission and contention-based Random Access, and is always activated.

**Timing Advance Group:** A group of Serving Cells that is configured by RRC and that, for the cells with a UL configured, using the same timing reference cell and the same Timing Advance value. A Timing Advance Group containing the SpCell of a MAC entity is referred to as Primary Timing Advance Group (PTAG), whereas the term Secondary Timing Advance Group (STAG) refers to other TAGs.

**UE-gNB RTT:** For non-terrestrial networks, the sum of the UE's Timing Advance value (see TS 38.211 [8] clause 4.3.1) and *kmac*.

**V2X sidelink communication**: AS functionality enabling V2X Communication as defined in TS 23.285 [20], between nearby UEs, using E-UTRA technology but not traversing any network node.

NOTE 1: A timer is running once it is started, until it is stopped or until it expires; otherwise it is not running. A timer can be started if it is not running or restarted if it is running. A Timer is always started or restarted from its initial value. The duration of a timer is not updated until it is stopped or expires (e.g. due to BWP switching). When the MAC entity applies zero value for a timer, the timer shall be started and immediately expire unless explicitly stated otherwise.

NOTE 2: In this version of the specification, the SRS in the procedural description includes Positioning SRS except for the Positioning SRS for transmission in RRC\_INACTIVE as in clause 5.26. Positioning SRS except for the Positioning SRS for transmission in RRC\_INACTIVE is treated the same as SRS by the UE unless explicitly stated otherwise.

===================================NEXT CHANGE=====================================

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AP Aperiodic

BFR Beam Failure Recovery

BSR Buffer Status Report

BWP Bandwidth Part

CE Control Element

CG Cell Group

CG-SDT Configured Grant-based SDT

CI-RNTI Cancellation Indication RNTI

CSI Channel State Information

CSI-IM CSI Interference Measurement

CSI-RS CSI Reference Signal

CS-RNTI Configured Scheduling RNTI

DAPS Dual Active Protocol Stack

DCP DCI with CRC scrambled by PS-RNTI

DL-PRS DownLink-Positioning Reference Signal

G-CS-RNTI Group Configured Scheduling RNTI

G-RNTI Group RNTI

IAB Integrated Access and Backhaul

INT-RNTI Interruption RNTI

LBT Listen Before Talk

LCG Logical Channel Group

LCP Logical Channel Prioritization

MBS Multicast/Broadcast Services

MCCH MBS Control Channel

MCCH-RNTI MBS Control Channel RNTI

MCG Master Cell Group

MPE Maximum Permissible Exposure

MTCH MBS Traffic Channel

NCD-SSB Non Cell Defining SSB

NSAG Network Slice AS Group

NUL Normal Uplink

NZP CSI-RS Non-Zero Power CSI-RS

PDB Packet Delay Budget

PEI-RNTI Paging Early Indication RNTI

PHR Power Headroom Report

PS-RNTI Power Saving RNTI

PTAG Primary Timing Advance Group

PTM Point to Multipoint

PTP Point to Point

QCL Quasi-colocation

PPW PRS Processing Window

PRS Positioning Reference Signal

RA-SDT Random Access-based SDT

RS Reference Signal

SCG Secondary Cell Group

SDT Small Data Transmission

SFI-RNTI Slot Format Indication RNTI

SI System Information

SL-PRS-RNTI SL-PRS RNTI

SL-PRS-CS-RNTI SL-PRS Configured Scheduling RNTI

SL-RNTI Sidelink RNTI

SL-CS-RNTI Sidelink Configured Scheduling RNTI

SL-PRS Sidelink PRS

SpCell Special Cell

SP Semi-Persistent

SP-CSI-RNTI Semi-Persistent CSI RNTI

SPS Semi-Persistent Scheduling

SR Scheduling Request

SRI SRS Resource Indicator

SS Synchronization Signals

SSB Synchronization Signal Block

STAG Secondary Timing Advance Group

SUL Supplementary Uplink

TAG Timing Advance Group

TCI Transmission Configuration Indicator

TPC-SRS-RNTI Transmit Power Control-Sounding Reference Signal-RNTI

TRIV Time Resource Indicator Value

TRP Transmit/Receive Point

TRS CSI-RS for tracking

U2N UE-to-Network

UCI Uplink Control Information

UTW Uplink Time Window

V2X Vehicle-to-Everything

ZP CSI-RS Zero Power CSI-RS

===================================NEXT CHANGE=====================================

5 MAC procedures

5.2 Maintenance of Uplink Time Alignment

RRC configures the following parameters for the maintenance of UL time alignment:

- *timeAlignmentTimer* (per TAG) which controls how long the MAC entity considers the Serving Cells belonging to the associated TAG to be uplink time aligned;

- *inactivePosSRS-TimeAlignmentTimer* which controls how long the MAC entity considers the Positioning SRS transmission in RRC\_INACTIVE in clause 5.26 to be uplink time aligned;

- *cg-SDT-TimeAlignmentTimer* which controls how long the MAC entity considers the uplink transmission for CG-SDT to be uplink time aligned;

- *srs-ValidityAreaTimeAlignmentTimer* which controls how long the MAC entity considers Positioning SRS transmission in RRC\_INACTIVE in clause 5.26 to be uplink time aligned when SRS positioning validity area is configured.

The MAC entity shall:

1> when a Timing Advance Command MAC CE is received, and if an NTA (as defined in TS 38.211 [8]) has been maintained with the indicated TAG:

2> apply the Timing Advance Command for the indicated TAG;

2> if there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.26:

3> if SRS positioning validity area is configured:

4> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.

3> else:

4> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG.

2> if CG-SDT procedure triggered as in clause 5.27 is ongoing:

3> start or restart the *cg-SDT-TimeAlignmentTimer* associated with the indicated TAG.

2> else:

3> start or restart the *timeAlignmentTimer* associated with the indicated TAG.

1> when a Timing Advance Command is received in a Random Access Response message for a Serving Cell belonging to a TAG or in a MSGB for an SpCell:

2> if the Random Access Preamble was not selected by the MAC entity among the contention-based Random Access Preamble:

3> apply the Timing Advance Command for this TAG;

3> start or restart the *timeAlignmentTimer* associated with this TAG.

2> else if the *timeAlignmentTimer* associated with this TAG is not running:

3> apply the Timing Advance Command for this TAG;

3> start the *timeAlignmentTimer* associated with this TAG;

3> when the Contention Resolution is considered not successful as described in clause 5.1.5; or

3> when the Contention Resolution is considered successful for SI request as described in clause 5.1.5, after transmitting HARQ feedback for MAC PDU including UE Contention Resolution Identity MAC CE:

4> stop *timeAlignmentTimer* associated with this TAG.

3> when the Contention Resolution is considered not successful as described in clause 5.1.5:

4> if CG-SDT procedure triggered as in clause 5.27 is ongoing:

5> set the NTA value to the value before applying the received Timing Advance Command as in TS 38.211 [8].

3> when the Contention Resolution is considered successful for Random Access procedure while the CG-SDT procedure is ongoing:

4> stop *timeAlignmentTimer* associated with this TAG;

4> start or restart the *cg-SDT-TimeAlignmentTimer* associated with this TAG.

3> when the Contention Resolution is considered successful for Random Access procedure while SRS transmission in RRC\_INACTIVE is ongoing:

4> if SRS positioning validity area is configured:

5> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.

4> else:

5> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with this TAG.

2> else:

3> ignore the received Timing Advance Command.

1> when an Absolute Timing Advance Command is received in response to a MSGA transmission including C-RNTI MAC CE as specified in clause 5.1.4a:

2> apply the Timing Advance Command for PTAG;

2> if there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.26:

3> if SRS positioning validity area is configured:

4> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.

3> else:

4> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG.

2> if CG-SDT procedure is ongoing:

3> start or restart the *cg-SDT-TimeAlignmentTimer* associated with PTAG.

2> else:

3> start or restart the *timeAlignmentTimer* associated with PTAG.

1> when the indication is received from upper layer for stopping the *inactivePosSRS-TimeAlignmentTimer*:

2> stop the *inactivePosSRS-TimeAlignmentTimer*.

1> when the indication is received from upper layer for starting the *inactivePosSRS-TimeAlignmentTimer*:

2> start or restart the *inactivePosSRS-TimeAlignmentTimer*.

1> when instruction from the upper layer has been received for starting the *cg-SDT-TimeAlignmentTimer*:

2> start the *cg-SDT-TimeAlignmentTimer*.

1> when instruction from the upper layer has been received for stopping the *cg-SDT-TimeAlignmentTimer*:

2> consider the *cg-SDT-TimeAlignmentTimer* as expired.

1> when the indication is received from upper layer for starting the *srs-ValidityArea-TimerAlignmentTimer*:

2> start or restart the *srs-ValidityArea-TimerAlignmentTimer*.

1> when the indication is received from upper layer for stopping the *srs-ValidityArea-TimerAlignmentTimer*:

2> stop the *srs-ValidityArea-TimerAlignmentTimer*.

1> when instruction from the upper layer has been received for starting the *TimeAlignmentTimer* associated with PTAG:

2> start the *TimeAlignmentTimer* associated with PTAG.

1> when a *timeAlignmentTimer* expires:

2> if the *timeAlignmentTimer* is associated with the PTAG:

3> flush all HARQ buffers for all Serving Cells;

3> notify RRC to release PUCCH for all Serving Cells, if configured;

3> notify RRC to release SRS for all Serving Cells, if configured;

3> clear any configured downlink assignments and configured uplink grants;

3> clear any PUSCH resource for semi-persistent CSI reporting;

3> consider all running *timeAlignmentTimer*s as expired;

3> maintain NTA (defined in TS 38.211 [8]) of all TAGs.

2> else if the *timeAlignmentTimer* is associated with an STAG, then for all Serving Cells belonging to this TAG:

3> flush all HARQ buffers;

3> notify RRC to release PUCCH, if configured;

3> notify RRC to release SRS, if configured;

3> clear any configured downlink assignments and configured uplink grants;

3> clear any PUSCH resource for semi-persistent CSI reporting;

3> maintain NTA (defined in TS 38.211 [8]) of this TAG.

1> when the *inactivePosSRS-TimeAlignmentTimer* expires:

2> notify RRC to release Positioning SRS for RRC\_INACTIVE configuration(s).

1> when the *cg-SDT-TimeAlignmentTimer* expires:

2> clear any configured uplink grants;

2> if a PDCCH addressed to the MAC entity's C-RNTI after initial transmission for the CG-SDT with CCCH message has not been received:

3> consider ongoing CG-SDT procedure as terminated;

3> indicate the expiry of *cg-SDT-TimeAlignmentTimer* to the upper layer.

2> flush all HARQ buffers;

2> maintain NTA (defined in TS 38.211 [8]) of this TAG.

When the MAC entity stops uplink transmissions for an SCell due to the fact that the maximum uplink transmission timing difference between TAGs of the MAC entity or the maximum uplink transmission timing difference between TAGs of any MAC entity of the UE is exceeded, the MAC entity considers the *timeAlignmentTimer* associated with the SCell as expired.

The MAC entity shall not perform any uplink transmission on a Serving Cell except the Random Access Preamble and MSGA transmission when the *timeAlignmentTimer* associated with the TAG to which this Serving Cell belongs is not running, CG-SDT procedure is not ongoing and SRS transmission in RRC\_INACTIVE as in clause 5.26 is not on-going. Furthermore, when the *timeAlignmentTimer* associated with the PTAG is not running, CG-SDT procedure is not ongoing and SRS transmission in RRC\_INACTIVE as in clause 5.26 is not ongoing, the MAC entity shall not perform any uplink transmission on any Serving Cell except the Random Access Preamble and MSGA transmission on the SpCell. The MAC entity shall not perform any uplink transmission except the Random Access Preamble and MSGA transmission when the *cg-SDT-TimeAlignmentTimer* is not running during the ongoing CG-SDT procedure as triggered in clause 5.27 and the *inactivePosSRS-TimeAlignmentTimer* or *srs-ValidityAreaTimeAlignmentTimer* is not running.

================================NEXT CHANGE=======================================

5.4.4 Scheduling Request

The Scheduling Request (SR) is used for requesting UL-SCH resources for new transmission.

The MAC entity may be configured with zero, one, or more SR configurations. An SR configuration consists of a set of PUCCH resources for SR across different BWPs and cells. For a logical channel or for SCell beam failure recovery (see clause 5.17) and for consistent LBT failure recovery (see clause 5.21), at most one PUCCH resource for SR is configured per BWP. For a logical channel serving a radio bearer configured with SDT, PUCCH resource for SR is not configured for SDT. For beam failure recovery of BFD-RS set(s) of Serving Cell, up to two PUCCH resources for SR is configured per BWP. For positioning measurement gap activation/deactivation request, a dedicated SR configuration is configured.

Each SR configuration corresponds to one or more logical channels and/or to SCell beam failure recovery and/or to consistent LBT failure recovery and/or to beam failure recovery of a BFD-RS set and/or to positioning measurement gap activation/deactivation request. Each logical channel, SCell beam failure recovery, beam failure recovery of a BFD-RS set and consistent LBT failure recovery, may be mapped to zero or one SR configuration, which is configured by RRC. The SR configuration of the logical channel that triggered a BSR (clause 5.4.5) or the SCell beam failure recovery or the beam failure recovery of a BFD-RS set or the consistent LBT failure recovery (clause 5.21) (if such a configuration exists) or positioning measurement gap activation/deactivation request (clause 5.25) is considered as corresponding SR configuration for the triggered SR. Any SR configuration may be used for an SR triggered by Pre-emptive BSR (clause 5.4.7) or Timing Advance reporting (clause 5.4.8).

RRC configures the following parameters for the scheduling request procedure:

- *sr-ProhibitTimer* (per SR configuration);

- *sr-TransMax* (per SR configuration).

The following UE variables are used for the scheduling request procedure:

- *SR\_COUNTER* (per SR configuration).

If an SR is triggered and there are no other SRs pending corresponding to the same SR configuration, the MAC entity shall set the *SR\_COUNTER* of the corresponding SR configuration to 0.

When an SR is triggered, it shall be considered as pending until it is cancelled.

All pending SR(s) for BSR triggered according to the BSR procedure (clause 5.4.5) prior to the MAC PDU assembly shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the MAC PDU is transmitted and this PDU includes a Long or Short BSR MAC CE which contains buffer status up to (and including) the last event that triggered a BSR (see clause 5.4.5) prior to the MAC PDU assembly. All pending SR(s) for BSR triggered according to the BSR procedure (clause 5.4.5) shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the UL grant(s) can accommodate all pending data available for transmission.

The MAC entity shall for each pending SR not triggered according to the BSR procedure (clause 5.4.5) for a Serving Cell:

1> if this SR was triggered by Pre-emptive BSR procedure (see clause 5.4.7) prior to the MAC PDU assembly and a MAC PDU containing the relevant Pre-emptive BSR MAC CE is transmitted; or

1> if this SR was triggered by beam failure recovery (see clause 5.17) of an SCell and a MAC PDU is transmitted and this PDU includes a MAC CE for BFR which contains beam failure recovery information for this SCell; or

1> if this SR was triggered by beam failure recovery (see clause 5.17) for a BFD-RS set of a Serving Cell and a MAC PDU is transmitted and this PDU includes an Enhanced BFR MAC CE or a Truncated Enhanced BFR MAC CE which contains beam failure recovery information for this BFD-RS set of the Serving Cell; or

1> if this SR was triggered by beam failure recovery (see clause 5.17) of an SCell and this SCell is deactivated (see clause 5.9); or

1> if this SR was triggered by beam failure recovery (see clause 5.17) for a BFD-RS set of an SCell and this SCell is deactivated (see clause 5.9); or

1> if the SR is triggered by positioning measurement gap activation/deactivation request (see clause 5.25) and the Positioning Measurement Gap Activation/Deactivation Request MAC CE that triggers the SR has already been cancelled; or

1> if this SR was triggered by consistent LBT failure recovery (see clause 5.21) of an SCell and a MAC PDU is transmitted and the MAC PDU includes an LBT failure MAC CE that indicates consistent LBT failure for this SCell; or

1> if this SR was triggered by consistent LBT failure recovery (see clause 5.21) of an SCell and all the triggered consistent LBT failure(s) for this SCell are cancelled; or

1> if this SR was triggered by Timing Advance reporting (see clause 5.4.8) and all the triggered Timing Advance reports are cancelled:

2> cancel the pending SR and stop the corresponding *sr-ProhibitTimer*, if running.

Only PUCCH resources on a BWP which is active at the time of SR transmission occasion are considered valid.

As long as at least one SR is pending, the MAC entity shall for each pending SR:

1> if the MAC entity has no valid PUCCH resource configured for the pending SR:

2> initiate a Random Access procedure (see clause 5.1) on the SpCell and cancel the pending SR.

1> else, for the SR configuration corresponding to the pending SR:

2> when the MAC entity has an SR transmission occasion on the valid PUCCH resource for SR configured; and

2> if *sr-ProhibitTimer* is not running at the time of the SR transmission occasion; and

2> if the PUCCH resource for the SR transmission occasion does not overlap with a measurement gap:

3> if the PUCCH resource for the SR transmission occasion overlaps with neither a UL-SCH resource whose simultaneous transmission with the SR is not allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCH-Groups* nor an SL-SCH resource; or

3> if the MAC entity is able to perform this SR transmission simultaneously with the transmission of the SL-SCH resource; or

3> if the MAC entity is configured with *lch-basedPrioritization*, and the PUCCH resource for the SR transmission occasion does not overlap with the PUSCH duration of an uplink grant received in a Random Access Response or with the PUSCH duration of an uplink grant addressed to Temporary C-RNTI or with the PUSCH duration of a MSGA payload, and the PUCCH resource for the SR transmission occasion for the pending SR triggered as specified in clause 5.4.5 overlaps with any other UL-SCH resource(s), and the physical layer can signal the SR on one valid PUCCH resource for SR, and the priority of the logical channel that triggered SR is higher than the priority of the uplink grant(s) for any UL-SCH resource(s) where the uplink grant was not already de-prioritized and its simultaneous transmission with the SR is not allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCHgroups*, and the priority of the uplink grant is determined as specified in clause 5.4.1; or

3> if both *sl-PrioritizationThres* and *ul-PrioritizationThres* are configured and the PUCCH resource for the SR transmission occasion for the pending SR triggered as specified in clause 5.22.1.5 overlaps with any UL-SCH resource(s) carrying a MAC PDU, and the value of the priority of the triggered SR determined as specified in clause 5.22.1.5 is lower than *sl-PrioritizationThres* and the value of the highest priority of the logical channel(s) in the MAC PDU is higher than or equal to *ul-PrioritizationThres* and any MAC CE prioritized as described in clause 5.4.3.1.3 is not included in the MAC PDU and the MAC PDU is not prioritized by upper layer according to TS 23.287 [19]; or

3> if an SL-SCH resource overlaps with the PUCCH resource for the SR transmission occasion for the pending SR triggered as specified in clause 5.4.5, and the MAC entity is not able to perform this SR transmission simultaneously with the transmission of the SL-SCH resource, and either transmission on the SL-SCH resource is not prioritized as described in clause 5.22.1.3.1a or the priority value of the logical channel that triggered SR is lower than *ul-PrioritizationThres*, if configured; or

3> if an SL-SCH resource overlaps with the PUCCH resource for the SR transmission occasion for the pending SR triggered as specified in clause 5.22.1.5, and the MAC entity is not able to perform this SR transmission simultaneously with the transmission of the SL-SCH resource, and the priority of the triggered SR determined as specified in clause 5.22.1.5 is higher than the priority of the MAC PDU determined as specified in clause 5.22.1.3.1a for the SL-SCH resource; or

3> if an SL-PRS resource overlaps with the PUCCH resource for the SR transmission occasion for the pending SR triggered as specified in clause 5.4.5, and the MAC entity is not able to perform this SR transmission simultaneously with the transmission of the SL-PRS resource, and either transmission on the SL-PRS resource is not prioritized as described in clause 5.22.1.3.1a or 5.22.1.3.1b or the priority value of the logical channel that triggered SR is lower than *ul-PrioritizationThres*, if configured; or

3> if an SL-PRS resource overlaps with the PUCCH resource for the SR transmission occasion for the pending SR triggered as specified in clause 5.22.1.5, and the MAC entity is not able to perform this SR transmission simultaneously with the transmission of the SL-PRS resource, and the priority of the triggered SR determined as specified in clause 5.22.1.5 is higher than the priority of the MAC PDU determined as specified in clause 5.22.1.3.1a for the SL-PRS resource:

4> consider the SR transmission as a prioritized SR transmission.

4> consider the other overlapping uplink grant(s), if any, as a de-prioritized uplink grant(s), except for the overlapping uplink grant(s) whose simultaneous transmission is allowed by configuration of *simultaneousPUCCH-PUSCH* or *simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup* or *simultaneousSR-PUSCH-diffPUCCH-Groups*;

4> if the de-prioritized uplink grant(s) is a configured uplink grant configured with *autonomousTx* whose PUSCH has already started:

5> stop the *configuredGrantTimer* for the corresponding HARQ process of the de-prioritized uplink grant(s);

5> stop the *cg-RetransmissionTimer* for the corresponding HARQ process of the de-prioritized uplink grant(s).

4> if *SR\_COUNTER* < *sr-TransMax*:

5> instruct the physical layer to signal the SR on one valid PUCCH resource for SR;

5> if LBT failure indication is not received from lower layers:

6> increment *SR\_COUNTER* by 1;

6> start the *sr-ProhibitTimer*.

5> else if *lbt-FailureRecoveryConfig* is not configured:

6> increment *SR\_COUNTER* by 1.

4> else:

5> notify RRC to release PUCCH for all Serving Cells;

5> notify RRC to release SRS for all Serving Cells;

5> clear any configured downlink assignments and uplink grants;

5> clear any PUSCH resources for semi-persistent CSI reporting;

5> initiate a Random Access procedure (see clause 5.1) on the SpCell and cancel all pending SRs.

3> else:

4> consider the SR transmission as a de-prioritized SR transmission.

NOTE 1: Except for SR for SCell beam failure recovery, the selection of which valid PUCCH resource for SR to signal SR on when the MAC entity has more than one overlapping valid PUCCH resource for the SR transmission occasion is left to UE implementation.

NOTE 2: If more than one individual SR triggers an instruction from the MAC entity to the PHY layer to signal the SR on the same valid PUCCH resource, the *SR\_COUNTER* for the relevant SR configuration is incremented only once.

NOTE 3: When the MAC entity has pending SR for SCell beam failure recovery and the MAC entity has one or more PUCCH resources (other than PUCCH resources of pending SR for beam failure recovery of a BFD-RS set) overlapping with PUCCH resource for SCell beam failure recovery for the SR transmission occasion, the MAC entity considers only the PUCCH resource for SCell beam failure recovery as valid. When the MAC entity has pending SR for beam failure recovery of a BFD-RS set of Serving Cell and the MAC entity has one or more PUCCH resources (other than PUCCH resources of pending SR for beam failure recovery) overlapping with PUCCH resource for beam failure recovery of that BFD-RS set for the SR transmission occasion, the MAC entity considers only the PUCCH resource for beam failure recovery of that BFD-RS set as valid.

NOTE 4: For a UE operating in a semi-static channel access mode as described in TS 37.213 [18], PUCCH resources overlapping with the set of consecutive symbols where the UE does not transmit before the start of a next channel occupancy time are not considered valid.

NOTE 5: If the MAC entity is configured with *lch-basedPrioritization*, the MAC entity does not take UCI multiplexing according to the procedure specified in TS 38.213 [6] into account when determining whether the valid PUCCH resource for the SR transmission can be signalled by the physical layer and the SR transmission occasion overlaps with the PUSCH duration of an uplink grant of a MSGA payload.

NOTE 6: When the MAC entity has PUCCH resource for pending SR for SCell beam failure recovery overlapping with PUCCH resource for pending SR for beam failure recovery of a BFD-RS set for the SR transmission occasion, it's up to UE implementation to select PUCCH resource for SCell beam failure recovery or PUCCH resource for beam failure recovery of a BFD-RS set.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BSR, which was initiated by the MAC entity prior to the MAC PDU assembly and which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes a BSR MAC CE which contains buffer status up to (and including) the last event that triggered a BSR (see clause 5.4.5) prior to the MAC PDU assembly; or

- the UL grant(s) can accommodate all pending data available for transmission.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL-BSR and/or SL-CSI reporting and/or SL-DRX command indication, which was initiated by the MAC entity prior to the sidelink MAC PDU assembly and which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes an SL-BSR MAC CE which contains buffer status up to (and including) the last event that triggered an SL-BSR (see clause 5.22.1.6) prior to the MAC PDU assembly; or

- the SL grant(s) can accommodate all pending data available and/or SL-CSI reporting MAC CE and/or SL-DRX command indication for transmission.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BFR of an SCell, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU contains a MAC CE for BFR which includes beam failure recovery information of that SCell; or

- the SCell is deactivated (as specified in clause 5.9) and all triggered BFRs for SCells are cancelled.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for BFR of a BFD-RS set of a Serving Cell, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU contains an Enhanced BFR MAC CE or a Truncated Enhanced BFR MAC CE which includes beam failure recovery information of that BFD-RS set of the Serving Cell.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for consistent LBT failure recovery, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes an LBT failure MAC CE that indicates consistent LBT failure for all the SCells that triggered consistent LBT failure; or

- all the SCells that triggered consistent LBT failure recovery are deactivated (see clause 5.9).

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for positioning measurement gap activation/deactivation request, which has no valid PUCCH resources configured, if:

- the Positioning Measurement Gap Activation/Deactivation Request MAC CE that triggers the SR corresponding to the Random Access procedure has already been cancelled.

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for Timing Advance report, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes a Timing Advance Report MAC CE (see clause 5.4.8).

The MAC entity may stop, if any, ongoing Random Access procedure due to a pending SR for SL-PRS Resource Request, which has no valid PUCCH resources configured, if:

- a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU includes a SL-PRS Resource Request MAC CE (see clause 5.22.1.xx).

================================NEXT CHANGE=======================================

5.8 Transmission and reception without dynamic scheduling

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*: SL-CS-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-PRS-ResourceID*: SL-PRS configuration index 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*: SL-CS-RNTI for activation, deactivation, and retransmission;

- *sl-PRS-CS-RNTI*: SL-PRS-CS-RNTI for activation, and deactivation;

- *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) and SL-PRS transmission occasion(s) according to *sl-TimeOffsetCG-Type1* and *sl-TimeResourceCG-Type1*, and to reoccur with *sl-periodCG* for transmissions of multiple MAC PDUs and SL-PRS(s) 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,$ PeriodicitySL=\left⌈\frac{T'\_{max} }{10240 ms}×sl-PeriodCG\right⌉$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 CHANGE=======================================

5.15 Bandwidth Part (BWP) operation

5.15.1 Downlink and Uplink

In addition to clause 12 of TS 38.213 [6], this clause specifies requirements on BWP operation.

A Serving Cell may be configured with one or multiple BWPs, and the maximum number of BWP per Serving Cell is specified in TS 38.213 [6].

The BWP switching for a Serving Cell is used to activate an inactive BWP and deactivate an active BWP at a time. The BWP switching is controlled by the PDCCH indicating a downlink assignment or an uplink grant, by the *bwp-InactivityTimer*, by RRC signalling, or by the MAC entity itself upon initiation of Random Access procedure or upon detection of consistent LBT failure on SpCell. Upon RRC (re-)configuration of *firstActiveDownlinkBWP-Id* and/or *firstActiveUplinkBWP-Id* for SpCell except for PSCell when SCG is deactivated (see clause 5.29) or activation of an SCell, the DL BWP and/or UL BWP indicated by *firstActiveDownlinkBWP-Id* and/or *firstActiveUplinkBWP-Id* respectively (as specified in TS 38.331 [5]) is active without receiving PDCCH indicating a downlink assignment or an uplink grant. Upon RRC (re-)configuration of *firstActiveDownlinkBWP-Id* for PSCell when SCG is deactivated, the DL BWP is switched to the *firstActiveDownlinkBWP-Id* as specified in TS 38.331 [5]. The active BWP for a Serving Cell is indicated by either RRC or PDCCH (as specified in TS 38.213 [6]). For unpaired spectrum, a DL BWP is paired with a UL BWP, and BWP switching is common for both UL and DL.

For each SCell a dormant BWP may be configured with *dormantBWP-Id* by RRC signalling as described in TS 38.331 [5]. Entering or leaving dormant BWP for SCells is done by BWP switching per SCell or per dormancy SCell group based on instruction from PDCCH (as specified in TS 38.213 [6]). The dormancy SCell group configurations are configured by RRC signalling as described in TS 38.331 [5]. Upon reception of the PDCCH indicating leaving dormant BWP, the DL BWP indicated by *firstOutsideActiveTimeBWP-Id* or by *firstWithinActiveTimeBWP-Id* (as specified in TS 38.331 [5] and TS 38.213 [6]) is activated. Upon reception of the PDCCH indicating entering dormant BWP, the DL BWP indicated by *dormantBWP-Id* (as specified in TS 38.331 [5]) is activated. The dormant BWP configuration for SpCell or PUCCH SCell is not supported.

BWP for SRS for positioning Tx frequency hopping can be configured for a Serving Cell in TS 38.331 [5]. BWP for SRS Tx frequency hopping is considered as activated when it is configured. BWP switching is not applicable for BWP for SRS Tx frequency hopping.

For each activated Serving Cell configured with a BWP, the MAC entity shall:

1> if a BWP is activated and the active DL BWP for the Serving Cell is not the dormant BWP and the Serving Cell is not the PSCell of deactivated SCG:

2> transmit on UL-SCH on the BWP;

2> transmit on RACH on the BWP, if PRACH occasions are configured;

2> monitor the PDCCH on the BWP;

2> transmit PUCCH on the BWP, if configured;

2> report CSI for the BWP;

2> transmit SRS on the BWP, if configured;

2> receive DL-SCH on the BWP;

2> (re-)initialize any suspended configured uplink grants of configured grant Type 1 on the active BWP according to the stored configuration, if any, and to start in the symbol according to rules in clause 5.8.2;

2> if *lbt-FailureRecoveryConfig* is configured:

3> stop the *lbt-FailureDetectionTimer*, if running;

3> set *LBT\_COUNTER* to 0;

3> monitor LBT failure indications from lower layers as specified in clause 5.21.2.

1> if a BWP is activated and the active DL BWP for the Serving Cell is dormant BWP:

2> stop the *bwp-InactivityTimer* of this Serving Cell, if running.

2> not monitor the PDCCH on the BWP;

2> not monitor the PDCCH for the BWP;

2> not receive DL-SCH on the BWP;

2> not report CSI on the BWP, report CSI except aperiodic CSI for the BWP;

2> not transmit SRS on the BWP;

2> not transmit on UL-SCH on the BWP;

2> not transmit on RACH on the BWP;

2> not transmit PUCCH on the BWP;

2> clear any configured downlink assignment and any configured uplink grant Type 2 associated with the SCell respectively;

2> suspend any configured uplink grant Type 1 associated with the SCell;

2> if configured, perform beam failure detection and beam failure recovery for the SCell if beam failure is detected.

1> if a BWP is deactivated or the Serving Cell is PSCell of deactivated SCG:

2> not transmit on UL-SCH on the BWP;

2> not transmit on RACH on the BWP;

2> not monitor the PDCCH on the BWP;

2> not transmit PUCCH on the BWP;

2> not report CSI for the BWP;

2> not transmit SRS on the BWP;

2> not receive DL-SCH on the BWP;

2> clear any configured downlink assignment and configured uplink grant of configured grant Type 2 on the BWP;

2> suspend any configured uplink grant of configured grant Type 1 on the inactive BWP.

Upon initiation of the Random Access procedure on a Serving Cell, after the selection of carrier for performing Random Access procedure as specified in clause 5.1.1, the MAC entity shall for the selected carrier of this Serving Cell:

1> if PRACH occasions are not configured for the active UL BWP:

2> if the UE is a RedCap UE; and

2> if *initialUplinkBWP-RedCap* is configured:

3> switch the active UL BWP to BWP indicated by *initialUplinkBWP-RedCap*.

2> else:

3> switch the active UL BWP to BWP indicated by *initialUplinkBWP*.

2> if the Serving Cell is an SpCell:

3> if the UE is a RedCap UE; and

3> if *initialDownlinkBWP-RedCap* is configured:

4> switch the active DL BWP to BWP indicated by *initialDownlinkBWP-RedCap*.

3> else:

4> switch the active DL BWP to BWP indicated by *initialDownlinkBWP*.

1> else:

2> if the Serving Cell is an SpCell:

3> if the active DL BWP does not have the same *bwp-Id* as the active UL BWP:

4> switch the active DL BWP to the DL BWP with the same *bwp-Id* as the active UL BWP.

1> stop the *bwp-InactivityTimer* associated with the active DL BWP of this Serving Cell, if running.

1> if the Serving Cell is SCell:

2> stop the *bwp-InactivityTimer* associated with the active DL BWP of SpCell, if running.

1> perform the Random Access procedure on the active DL BWP of SpCell and active UL BWP of this Serving Cell.

If the MAC entity receives a PDCCH for BWP switching of a Serving Cell, the MAC entity shall:

1> if there is no ongoing Random Access procedure associated with this Serving Cell; or

1> if the ongoing Random Access procedure associated with this Serving Cell is successfully completed upon reception of this PDCCH addressed to C-RNTI (as specified in clauses 5.1.4, 5.1.4a, and 5.1.5):

2> cancel, if any, triggered consistent LBT failure for this Serving Cell;

2> perform BWP switching to a BWP indicated by the PDCCH.

If the MAC entity receives a PDCCH for BWP switching for a Serving Cell(s) or a dormancy SCell group(s) while a Random Access procedure associated with that Serving Cell is ongoing in the MAC entity, it is up to UE implementation whether to switch BWP or ignore the PDCCH for BWP switching, except for the PDCCH reception for BWP switching addressed to the C-RNTI for successful Random Access procedure completion (as specified in clauses 5.1.4, 5.1.4a, and 5.1.5) in which case the UE shall perform BWP switching to a BWP indicated by the PDCCH. Upon reception of the PDCCH for BWP switching other than successful contention resolution, if the MAC entity decides to perform BWP switching, the MAC entity shall stop the ongoing Random Access procedure and initiate a Random Access procedure after performing the BWP switching; if the MAC decides to ignore the PDCCH for BWP switching, the MAC entity shall continue with the ongoing Random Access procedure on the Serving Cell.

Upon reception of RRC (re-)configuration for BWP switching for a Serving Cell while a Random Access procedure associated with that Serving Cell is ongoing in the MAC entity, the MAC entity shall stop the ongoing Random Access procedure and initiate a Random Access procedure after performing the BWP switching.

Upon reception of RRC (re-)configuration for BWP switching for a Serving Cell, cancel any triggered consistent LBT failure in this Serving Cell.

The MAC entity shall for each activated Serving Cell configured with *bwp-InactivityTimer*:

1> if the *defaultDownlinkBWP-Id* is configured, and the active DL BWP is not the BWP indicated by the *defaultDownlinkBWP-Id*, and the active DL BWP is not the BWP indicated by the *dormantBWP-Id* if configured; or

1> if the UE is not a RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and the active DL BWP is not the *initialDownlinkBWP*, and the active DL BWP is not the BWP indicated by the *dormantBWP-Id* if configured; or

1> if the UE is a RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is not configured, and the active DL BWP is not the *initialDownlinkBWP*; or

1> if the UE is a RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is configured, and the active DL BWP is not the *initialDownlinkBWP-RedCap*:

2> if a PDCCH addressed to C-RNTI or CS-RNTI indicating downlink assignment or uplink grant is received on the active BWP; or

2> if a PDCCH addressed to G-RNTI or G-CS-RNTI configured for multicast indicating downlink assignment is received on the active BWP; or

2> if a PDCCH addressed to C-RNTI or CS-RNTI indicating downlink assignment or uplink grant is received for the active BWP; or

2> if a MAC PDU is transmitted in a configured uplink grant and LBT failure indication is not received from lower layers; or

2> if a MAC PDU is received in a configured downlink assignment for unicast or MBS multicast:

3> if there is no ongoing Random Access procedure associated with this Serving Cell; or

3> if the ongoing Random Access procedure associated with this Serving Cell is successfully completed upon reception of this PDCCH addressed to C-RNTI (as specified in clauses 5.1.4, 5.1.4a and 5.1.5):

4> start or restart the *bwp-InactivityTimer* associated with the active DL BWP.

2> if the *bwp-InactivityTimer* associated with the active DL BWP expires:

3> if the *defaultDownlinkBWP-Id* is configured:

4> perform BWP switching to a BWP indicated by the *defaultDownlinkBWP-Id*.

3> else:

4> if the UE is a RedCap UE; and

4> if *initialDownlinkBWP-RedCap* is configured:

5> perform BWP switching to the *initialDownlinkBWP-RedCap*.

4> else:

5> perform BWP switching to the *initialDownlinkBWP*.

NOTE: If a Random Access procedure is initiated on an SCell, both this SCell and the SpCell are associated with this Random Access procedure.

1> if a PDCCH for BWP switching is received, and the MAC entity switches the active DL BWP:

2> if the *defaultDownlinkBWP-Id* is configured, and the MAC entity switches to the DL BWP which is not indicated by the *defaultDownlinkBWP-Id* and is not indicated by the *dormantBWP-Id* if configured; or

2> if the UE is not a RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and the MAC entity switches to the DL BWP which is not the *initialDownlinkBWP* and is not indicated by the *dormantBWP-Id* if configured; or

2> if the UE is a RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is not configured, and the MAC entity switches to the DL BWP which is not the *initialDownlinkBWP*; or

2> if the UE is a RedCap UE, and if the *defaultDownlinkBWP-Id* is not configured, and *initialDownlinkBWP-RedCap* is configured, and the MAC entity switches to the DL BWP which is not the *initialDownlinkBWP-RedCap*:

3> start or restart the *bwp-InactivityTimer* associated with the active DL BWP.

Upon initiation of the Random Access procedure, after selection of the carrier for performing Random Access procedure as specified in clause 5.1.1, if the UE is a RedCap UE in RRC\_IDLE or RRC\_INACTIVE mode, the MAC entity shall:

1> if *initialUplinkBWP-RedCap* is configured for the selected carrier:

2> perform the Random Access procedure as specified in clause 5.1 by using the BWP configured by *initialUplinkBWP-RedCap*.

1> else:

2> perform the Random Access procedure as specified in clause 5.1 by using the BWP configured by *initialUplinkBWP*.

1> if *initialDownlinkBWP-RedCap* is configured:

2> if the Random Access procedure was initiated for SI request (as specified in TS 38.331 [5]) and the Random Access Resources for SI request have been explicitly provided by RRC, and if the selected carrier is SUL carrier:

3> monitor the PDCCH on the BWP configured by *initialDownlinkBWP*.

2> else:

3> monitor the PDCCH on the BWP configured by *initialDownlinkBWP-RedCap*.

1> else:

2> monitor the PDCCH on the BWP configured by *initialDownlinkBWP*.

================================NEXT 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-PRS 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-PRS 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-PRS 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-PRS 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;

2> cancel, if any, triggered Sidelink DRX Command MAC CE;

2> cancel, if any, triggered Sidelink IUC-Request transmission procedure;

2> cancel, if any, triggered Sidelink IUC-Information Reporting procedure.

================================NEXT CHANGE=======================================

5.22 SL-SCH Data transfer and SL-PRS transmission

5.22.1 SL-SCH Data and SL-PRS transmission

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 may 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. The MAC entity may have a sidelink grant on the SL-PRS shared resource pool of an active BWP to determine a set of PSCCH durations(s) in which transmission of SCI occurs and a set of SL-PRS transmission occasion(s) and PSSCH duration(s) in which transmission of SL-PRS and SL-SCH associated with the SCI occur. The MAC entity may have a sidelink grant on the SL-PRS dedicated resource pool of an active BWP to determine a set of PSCCH duration(s) in which transmission of SCI occurs and a set of SL-PRS transmission occasion(s) in which transmission of SL-PRS associated to the SCI occurs. A sidelink grant addressed to SL-CS-RNTI with NDI = 1 is considered as a dynamic sidelink grant. A sidelink grant addressed to SL-PRS-CS-RNTI with Activation/Release indication = 1 as in clause 7.3.1.4.3 in TS 38.212 [9] 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] or if the MAC entity has been configured with Sidelink resource allocation scheme 1 as indicated in TS 38.331 [5] and PDCCH is received for resource allocation on SL-PRS shared resource pool, 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) and SL-PRS transmission occasion(s), if available, 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] and SL-PRS according to clause 8.1.4 of TS 38.214 [7].

2> else:

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

NOTE: When SL-PRS is transmitted on SL-PRS shared resource pool, the PSSCH duration(s) and SL-PRS transmission occasion(s) are determined only after the LCP procedure in clause 5.22.1.4.1.

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

2> if PDCCH contents indicate retransmission(s) for the identified 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) and SL-PRS transmission occasion(s), if available, for one or more retransmissions of a single MAC PDU and SL-PRS 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] and the set of SL-PRS transmission occasions for transmission of multiple SL-PRS according to clause of 8.2.4 of TS 38.214 [7], if available.

1> if a dynamic 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:

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

If the MAC entity has been configured with Sidelink resource allocation scheme 1 as in TS 38.331 [5] and PDCCH is received for resource allocation on SL-PRS dedicated resource pool, the MAC entity shall for each PDCCH occasion:

1> if a sidelink grant has been received on the PDCCH for the MAC entity's SL-PRS-RNTI: (i.e., dynamic grant)

2> use the received sidelink grant to determine the PSCCH duration(s) and the corresponding SL-PRS occasion(s) for the transmission of SL-PRS.

1> else if a sidelink grant has been received on the PDCCH for MAC entity's SL-PRS-CS-RNTI: (i.e., configured sidelink grant type 2)

2> if the PDCCH content indicates the configured grant Type 2 activation for a configured sidelink grant:

3> store the configured sidelink grant;

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

3> initialise or re-initialise the configured sidelink grant to determine the set of PSCCH duration(s) and the corresponding SL-PRS occasion for the transmission of SL-PRS.

2> else if the PDCCH content indicates the configured Type 2 deactivation for a configured sidelink grant:

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

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

NOTE: For SL-PRS transmission by Sidelink resource allocation scheme 2 on SL-PRS dedicated resource pool, partial sensing is not supported.

NOTE 1: If the MAC entity is configured with Sidelink resource allocation mode 2 or Sidelink resource allocation scheme 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 partial sensing, or full 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*.

NOTE 2A: For the transmission of Sidelink Inter-UE Coordination Request MAC CE, the MAC entity selects the TX pool of resource where the IUC resource set is required. For the transmission of Sidelink Inter-UE Coordination Information MAC CE, the MAC entity selects the TX pool of resource where the IUC resource set is located.

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; or

1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmission(s) of multiple SL-PRS(s), which have been triggered by the upper layer or by the reception of a SCI from a peer UE:2> if the MAC entity has not selected a pool of resources allowed for the logical channel or SL-PRS transmission:

3> if SL data is available in the logical channel for NR sidelink discovery:

4> if *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* is configured according to TS 38.331 [5]:

5> select the *sl-DiscTxPoolSelected* configured in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* for the transmission of NR sidelink discovery message.

4> else:

5> select any pool of resources among the configured pools of resources except for SL-PRS dedicated resource pool, if configured.

3> else 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 except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured or SL-PRS dedicated resource pool, if configured.

3> else if SL-PRS is pending for transmission:

4> select any resource pool among the resource pool(s) allowing for SL-PRS transmission.

3> else:

4> select any pool of resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured or SL-PRS dedicated resource pool, if configured.

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> if one or multiple SL DRX(s) is configured in the destination UE(s) receiving SL-SCH data:

4> indicate to the physical layer SL DRX Active time in the destination UE(s) receiving SL-SCH data, as specified in clause 5.28.2.

3> select one of the allowed values configured by RRC in *sl-ResourceReservePeriodList* and set the resource reservation interval, $P\_{rsvp\\_TX}$, 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 or remaining SL-PRS delay budget.

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 $\left[5×\left⌈\frac{100}{max\left(20, P\_{rsvp\\_TX}\right)}\right⌉,15×\left⌈\frac{100}{max\left(20, P\_{rsvp\\_TX}\right)}\right⌉\right] $ for the resource reservation interval lower than 100ms and set *SL\_RESOURCE\_RESELECTION\_COUNTER* to the selected value;

3> if the selected resource pool is not SL-PRS dedicated resource pool:

4> 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) and pending SL-PRS transmission(s), if available, 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 or the corresponding *sl-DefaultCBR-PartialSensing* configured by RRC if partial sensing is selected and CBR measurement results are not available, or the corresponding *sl-DefaultCBR-RandomSelection* configured by RRC if random selection is selected and CBR measurement results are not available in case the *sl-TxPoolExceptional* is not used;

3> else if the selected resource pool is SL-PRS dedicated resource pool:

4> select the number of SL-PRS retransmissions from the allowed numbers, if configured by RRC, in *[ffs\_rrc\_parameter]*;

3> if the selected resource pool is not SL-PRS dedicated resource pool:

4> 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) and pending SL-PRS transmission(s), if available, 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 or the corresponding *sl-DefaultCBR-PartialSensing* configured by RRC if partial sensing is selected and CBR measurement results are not available, or the corresponding *sl-DefaultCBR-RandomSelection* configured by RRC if random selection is selected and CBR measurement results are not available in case the *sl-TxPoolExceptional* is not used;

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is not configured by RRC:

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

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resource pool which occur within the SL DRX Active time, if configured, as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier.

NOTE: When there are both SL data available in the logical channel(s) and SL-PRS pending for transmission, the resources are selected based on the shorter one of the corresponding remaining PDB and the corresponding remaining SL-PRS delay budget.

5> else if the selected resource pool is SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resource pool as specified in clause 5.28.2 of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission(s).

4> else:

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6> 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] which occur within the SL DRX Active time, if configured, as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier.

5> else if the selected resource pool is SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resources indicated by physical layer as clasue 8.2.4 of TS 38.214 [7] as specified in clause 5.28.2 of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission(s).

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and preferred resource set is not received from a UE:

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

5> if the selected resource pool is not SL-PRS dedicated resource pool:

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

5> else if the selected resource pool is SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resource pool which as specified in clause 5.28.2 of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission(s).

4> else:

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6> 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, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier.

5> else if the selected resource pool is SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resources indicated by physical layer as clause 8.2.4 of TS 38.214 [7] of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission.

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE does not have its own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE and if the selected resource pool is not SL-PRS dedicated resource pool:

4> randomly select the time and frequency resources for one transmission opportunity from the resources belonging to the received preferred resource set for SL-SCH data to be transmitted to the UE providing the preferred resource set, according to the amount of selected frequency resources and the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier.

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE has its own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE and if the selected resource pool is not SL-PRS dedicated resource pool:

4> randomly select the time and frequency resources for one transmission opportunity within the intersection of the received preferred resource set and the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] for an SL-SCH data to be transmitted to the UE providing the preferred resource set, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s) , and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier.

4> if there are no resources within the intersection that can be selected as the time and frequency resources for the one transmission opportunity 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.

5> 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, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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, PSSCH and SL-PRS corresponding to the number of transmission opportunities of MAC PDUs or SL-PRSs determined in TS 38.214 [7].

3> if one or more SL-PRS retransmissions are selected and the selected resource pool is SL-PRS dedicated resource pool:

4> randomly select the time and frequency resources for one or more transmission opportunities from the available resources, according to the selected number of retransmissions and the remaining SL-PRS delay budget 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];

4> use the randomly selected resource to select a set of periodic resources spaced by the resource reservation interval for transmissions of PSCCH and SL-PRS corresponding to the number of retransmission opportunities of SL-PRS;

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

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

3> else if one or more HARQ retransmissions are selected and the selected resource pool is not SL-PRS dedicated resource pool:

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is not configured by RRC:

5> if transmission based on full sensing or partial 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

5> 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:

6> randomly select the time and frequency resources for one or more transmission opportunities from the available resources which occur within the SL DRX Active time, if configured, as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, according to the amount of selected frequency resources, the selected number of HARQ retransmissions, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and preferred resource set is not received from a UE:

5> if transmission based on full sensing or partial 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

5> 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:

6> 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, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE has own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE:

5> if there are available resources left in the intersection of the received preferred resource set and the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] for more transmission opportunities:

6> randomly select the time and frequency resources for one or more transmission opportunities from the available resources within the intersection for SL-SCH data to be transmitted to the UE providing the preferred resource set, according to the amount of selected frequency resources, the selected number of HARQ retransmissions, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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> if the number of time and frequency resources that has been maximally selected for one or more transmission opportunities from the available resources within the intersection is smaller than the selected number of HARQ retransmissions and there are available resources left in the resources indicated by the physical layer for more transmission opportunities:

6> randomly select the time and frequency resources for the remaining transmission opportunities except for the selected resources within the intersection from the available resources outside the intersection but left in the resources indicated by the physical layer according to clause 8.1.4 of TS 38.214 [7], according to the amount of selected frequency resources, the selected number of HARQ retransmissions, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE does not have own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE; and

4> if there are available resources left in the received preferred resource set for more transmission opportunities:

5> randomly select the time and frequency resources for one or more transmission opportunities from the available resources belonging to the received preferred resource set for SL-SCH data to be transmitted to the UE providing the preferred resource set, according to the amount of selected frequency resources, the selected number of HARQ retransmissions, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> use the randomly selected resource to select a set of periodic resources spaced by the resource reservation interval for transmissions of PSCCH, PSSCH, if available and SL-PRS, if available corresponding to the number of retransmission opportunities of the MAC PDUs determined in TS 38.214 [7] or SL-PRS(s);

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

4> 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 and the set of SL-PRS transmission occasion(s), if available, according to TS 38.214 [7] if the selected resource pool is not SL-PRS dedicated resource pool or to determine the set of PSCCH durations and SL-PRS transmission occasion(s) if the selected resource pool is SL-PRS dedicated resource pool 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 $\left[5×\left⌈\frac{100}{max\left(20, P\_{rsvp\\_TX}\right)}\right⌉,15×\left⌈\frac{100}{max\left(20, P\_{rsvp\\_TX}\right)}\right⌉\right] $ 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 or SL-PRS(s) determined in TS 38.214 [7] with the resource reservation interval to determine the set of PSCCH durations, the set of PSSCH durations, and the pending SL-PRS transmission(s), if available, 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 an SL-CSI reporting is triggered, or a Sidelink DRX Command indication is triggered or a Sidelink Inter-UE Coordination Information reporting is triggered, or a Sidelink Inter-UE Coordination Request is triggered:

1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmission of a single SL-PRS transmission, which has been triggered by the upper layer or by the reception of a SCI from a peer UE:

2> if SL data is available in the logical channel for NR sidelink discovery:

3> if *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* is configured according to TS 38.331 [5]:

4> select the *sl-DiscTxPoolSelected* configured in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* for the transmission of NR sidelink discovery message.

3> else:

4> select any pool of resources among the configured pools of resources except for SL-PRS dedicated resource pool, if configured.

2> else if SL data for NR sidelink communication 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 except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured or SL-PRS dedicated resource pool, if configured.

3> else:

4> select any pool of resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured or SL-PRS dedicated resource pool, if configured.

2> else if an SL-CSI reporting or a Sidelink DRX Command or a Sidelink Inter-UE Coordination Request or a Sidelink Inter-UE Coordination Information is triggered:

3> select any pool of resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured or SL-PRS dedicated resource pool, if configured.

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> if one or multiple SL DRX(s) is configured in the destination UE(s) receiving SL-SCH data:

4> indicate to the physical layer SL DRX Active time in the destination UE(s) receiving SL-SCH data, as specified in clause 5.28.2.

3> if the selected resource pool is not SL-PRS dedicated resource pool:

4> 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) and pending SL-PRS transmission(s), if available 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 or the corresponding *sl-DefaultCBR-PartialSensing* configured by RRC if partial sensing is selected and CBR measurement results are not available, or the corresponding *sl-DefaultCBR-RandomSelection* configured by RRC if random selection is selected and CBR measurement results are not available in case the *sl-TxPoolExceptional* is not used;

3> if the selected resource pool is SL-PRS dedicated resource pool:

4> select the number of SL-PRS retransmissions from the allowed numbers, if configured by RRC, in *[ffs\_rrc\_parameter]*;

3> if the selected resource pool is not SL-PRS dedicated resource pool:

4>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) and pending SL-PRS transmission(s), if available, 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 or the corresponding *sl-DefaultCBR-PartialSensing* configured by RRC if partial sensing is selected and CBR measurement results are not available, or the corresponding *sl-DefaultCBR-RandomSelection* configured by RRC if random selection is selected and CBR measurement results are not available in case the *sl-TxPoolExceptional* is not used;

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is not configured by RRC:

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

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6>randomly select the time and frequency resources for one transmission opportunity from the resources pool which occur within the SL DRX Active time, if configured, as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier, and the latency requirement of the triggered SL CSI reporting.

5> if the selected resource pool is SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resource pool as specified in clause 5.28.2 of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission.

4> else:

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6> 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] which occur within the SL DRX Active time, if configured, as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier, and/or the latency requirement of the triggered SL-CSI reporting.

5> if the selected resource pool is SL-PRS dedicated resource pool:

6> randomly select the time and frequency resources for one transmission opportunity from the resources indicated by physical layer as clasue 8.2.4 of TS 38.214 [7] as specified in clause 5.28.2 of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission.

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and preferred resource set is not received from a UE:

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

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6> 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), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier, and/or the latency requirement of the triggered SL CSI reporting.

4> else:

5> if the selected resource pool is not SL-PRS dedicated resource pool:

6> 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, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier, and/or the latency requirement of the triggered SL CSI reporting.

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE does not have own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE and if the selected resource pool is not SL-PRS dedicated resource pool:

4> randomly select the time and frequency resources for one transmission opportunity from the resources belonging to the received preferred resource set for a MAC PDU to be transmitted to the UE providing the preferred resource set, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available,allowed on the carrier, and/or the latency requirement of the triggered SL CSI reporting.

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE has own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE and if the selected resource pool is not SL-PRS dedicated resource pool:

4> randomly select the time and frequency resources for one transmission opportunity within the intersection of the received preferred resource set and the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] for a MAC PDU to be transmitted to the UE providing the preferred resource set, according to the amount of selected frequency resources, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier, and/or the latency requirement of the triggered SL CSI reporting;

4> if there are no resources within the intersection that can be selected as the time and frequency resources for the one transmission opportunity 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.

5> 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, the remaining PDB of SL data available in the logical channel(s), and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, allowed on the carrier, and/or the latency requirement of the triggered SL CSI reporting.

3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE determines the resources for Sidelink Inter-UE Coordination Information transmission upon explicit request from a UE:

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, 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 and the latency requirement of the Sidelink Inter-UE Coordination Information transmission, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available.

3> if one or more SL-PRS retransmissions are selected and the selected resource pool is SL-PRS dedicated resource pool:

4> randomly select the time and frequency resources for one or more transmission opportunities from the available resources, according to the selected number of retransmissions and the remaining SL-PRS delay budget 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];

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

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

3> else if one or more HARQ retransmissions are selected and the selected resource pool is not SL-PRS dedicated resource pool:

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is not configured by RRC:

5> if transmission based on full sensing or partial 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

5> 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:

6> randomly select the time and frequency resources for one or more transmission opportunities from the available resources which occur within the SL DRX Active time, if configured, as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, 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, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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];

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and preferred resource set is not received from a UE:

5> 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

5> 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:

6> 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, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE has own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE:

5> if there are available resources left in the intersection of the received preferred resource set and the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] for more transmission opportunities:

6> randomly select the time and frequency resources for one or more transmission opportunities from the available resources within the intersection for a MAC PDU to be transmitted to the UE providing the preferred resource set, 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, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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> if the number of time and frequency resources that has been maximally selected for one or more transmission opportunities from the available resources within the intersection is smaller than the selected number of HARQ retransmissions and there are available resources left in the resources indicated by the physical layer for more transmission opportunities:

6> randomly select the time and frequency resources for the remaining transmission opportunities except for the selected resources within the intersection from the available resources outside the intersection but left in the resources indicated by the physical layer according to clause 8.1.4 of TS 38.214 [7], 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, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE does not have own sensing result as specified in clause 8.1.4 of TS 38.214 [7] and if a preferred resource set is received from a UE; and

4> if there are available resources left in the received preferred resource set for more transmission opportunities:

5> randomly select the time and frequency resources for one or more transmission opportunities from the available resources belonging to the received preferred resource set for a MAC PDU to be transmitted to the UE providing the preferred resource set, 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, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available, 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].

4> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and when the UE determines the resources for Sidelink Inter-UE Coordination Information transmission upon explicit request from a UE:

5> 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, 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 and the latency requirement of the Sidelink Inter-UE Coordination Information transmission, and the remaining SL-PRS delay budget of the SL-PRS transmission(s), if available.

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

4> 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) and the SL-PRS transmission occasion(s), if available, according to TS 38.214 [7] if the selected resource pool is not SL-PRS dedicated resource pool or to determine the PSCCH duration(s) and SL-PRS transmission occasion(s) if the selected resource pool is SL-PRS dedicated resource pool according to TS 38.214 [7].

NOTE 3A1: If *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is configured by RRC and if multiple preferred resource sets are received from the same UE, it is up to UE implementation to use one or multiple of them in its resource (re)selection.

NOTE 3B1: 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.

NOTE 3B2: When the UE receives both a single preferred resource set and a single non-preferred resource set from the same peer UE or different peer UEs, when the UE has own sensing results, it is up to the UE implementation to use the preferred resource set in its resource (re)selection for transmissions to the peer UE providing the preferred resource set.

NOTE 3B3: The UE is not required to use any resource from the preferred resource set in its resource (re-)selection if that resource is earlier than ($T\_{proc,0}^{SL}$+$T\_{proc,1}^{SL}$+$T\_{proc,2}^{SL}$) after the resource of Inter-UE Coordination Information transmission, where $T\_{proc,2}^{SL}$ is equal to ($T\_{proc,0}^{SL}$+$T\_{proc,1}^{SL}$) when only MAC CE is used for inter-UE Coordination Information transmission, or $T\_{proc,2}^{SL}$ is equal to $T\_{proc,0}^{SL}$ when MAC CE and SCI format 2-C are both used for Inter-UE Coordination Information transmission. The case when $T\_{proc,2}^{SL}$ is equal to $T\_{proc,0}^{SL}$ is assuming that SCI format 2-C is received. $ T\_{proc,0}^{SL}$ and $T\_{proc,1}^{SL}$ are specified in clause 8.1.4 of TS 38.214 [7].

NOTE 3B4: For Inter-UE Coordination Information triggered by an explicit Inter-UE Coordination Request in Scheme 1, whether or not to transmit the Inter-UE Coordination Information upon the Inter-UE Coordination Request reception is determined by UE-A's implementation subject to Release-16 procedure of UL/SL prioritization, LTE SL/NR SL prioritization, and congestion control.

NOTE 3B5**:** If configured by RRC, *sl-IUC-Explicit* set to *enabled* and an SL-IUC request is received for the Source Layer-2 ID and Destination Layer-2 ID pair of a unicast, MAC layer indicates to physical layer the resource selection window, resource set type (i.e., preferred resource set), L1 priority, the number of sub-channels to be used for the PSSCH/PSCCH transmission and the resource reservation period for preferred resource set. If configured by RRC, *sl-IUC-Explicit* set to *enabled* and an SL-IUC request is received for the Source Layer-2 ID and Destination Layer-2 ID pair of a unicast, MAC layer indicates to physical layer resource set type (i.e., non-preferred resource set) and the resource selection window for non-preferred resource set.

NOTE 3B6**:** If either *sl-IUC-Explicit* or *sl-IUC-Condition* is configured as *enabled*,UE considers the reception of preferred and non-preferred resource is enabled.

NOTE 3B7: When *sl-TriggerConditionCoordInfo* is set to value 0, for groupcast or broadcast of Inter-UE Coordination Information triggered by a condition in Scheme 1, which Destination Layer-2 ID (and the corresponding cast-type) a UE selects among Destination Layer-2 IDs that are already used or interested in NR sidelink transmission is up to the UE implementation.

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 not on SL-PRS dedicated resource pool:

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 or Sidelink resource allocation Scheme 1 for SL-PRS transmission on SL-PRS shared resource pool:

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 if the MAC entity has been configured with Sidelink resource allocation mode 2 or Sidelink resource allocation Scheme 2 for SL-PRS transmission on SL-PRS shared resource pool:

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 or pending SL-PRS transmission(s), if available, 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 or the corresponding *sl-DefaultCBR-PartialSensing* configured by RRC if partial sensing is selected and CBR measurement results are not available, or the corresponding *sl-DefaultCBR-RandomSelection* configured by RRC if random selection is selected and CBR measurement results are not available in case the *sl-TxPoolExceptional* is not used;

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.

The MAC entity shall for each PSCCH duration on SL-PRS dedicated resource pool:

1> if the MAC entity is not configured with multiple SL-PRS transmissions with Sidelink resource allocation scheme 2; or

1> if the MAC entity is configured with Sidelink resource allocation scheme 1:

2> set the resource reservation period to 0.

1> else if the MAC entity is configured with multiple SL-PRS transmission with Sidelink resource allocation scheme 2:

2> set the resource reservation period to the selected value.

1> 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:

2> set the SL-PRS Process ID to the SL-PRS 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;

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

1> process the sidelink grant according to clause 5.22.1.3.xx with the corresponding SL-PRS transmission information.

For configured sidelink grants not on SL-PRS dedicated resource pool, the HARQ Process ID associated with the first slot of an SL transmission is derived from the following equation:

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

For configured sidelink grant on SL-PRS dedicated resource pool, the SL-PRS Process ID associated with the first slot of an SL transmission is derived from the following equation:

 SL-PRS Process ID = [floor(CURRENT\_slot / *PeriodicitySL*)] modulo *[nrOfSL-PRSProc]*

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

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> except for SL-PRS transmission on SL-PRS dedicated resource pool, if PSCCH duration(s) and 2nd stage SCI on PSSCH for all transmissions of a MAC PDU of any selected sidelink grant(s) are not in SL DRX Active time as specified in clause 5.28.3 of the destination that has data to be sent; or

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> except for SL-PRS transmission on SL-PRS dedicated resource pool, 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 or the remaining SL-PRS delay budget for SL-PRS transmission, if available, and the MAC entity selects not to perform transmission(s) corresponding to a single MAC PDU or SL-PRS transmission:

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 CHANGE=======================================

5.22.1.2a Re-evaluation and Pre-emption

A resource(s) of the selected sidelink grant for a MAC PDU to transmit from multiplexing and assembly entity or for a SL-PRS transmission is re-evaluated by physical layer at *T3* before the slot where the SCI indicating the resource(s) is signalled at first time as specified in clause 8.1.4 of TS 38.214 [7].

A resource(s) of the selected sidelink grant which has been indicated by a prior SCI for a MAC PDU to transmit from multiplexing and assembly entity or for a SL-PRS transmission could be checked for pre-emption by physical layer at *T3* before the slot where the resource(s) is located as specified in clause 8.1.4 of TS 38.214 [7].

NOTE 1: It is up to UE implementation to re-evaluate or pre-empt before 'm – *T3*' or after 'm – *T3*' but before 'm'. For re-evaluation, m is the slot where the SCI indicating the resource(s) is signalled at first time as specified in clause 8.1.4 of TS 38.214. For pre-emption, m is the slot where the resource(s) is located as specified in clause 8.1.4 of TS 38.214.

If the MAC entity has been configured with Sidelink resource allocation mode 2 or Sidelink resource allocation scheme 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 or for each SL-PRS transmission:

1> if a resource(s) of the selected sidelink grant which has not been identified by a prior SCI is indicated for re-evaluation by the physical layer as specified in clause 8.1.4 of TS 38.214 [7];

2> remove the resource(s) from the selected sidelink grant associated to the Sidelink process or SL-PRS transmission;

2> if the selected resource pool is not SL-PRS dedicated resource pool:

3> randomly select the time and frequency resource from the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] for either the removed resource or the dropped resource, according to the amount of selected frequency resources, the selected number of HARQ retransmissions and the remaining PDB of either SL data available in the logical channel(s), and the remaining SL-PRS delay budget for SL-PRS transmission, if available, by ensuring the minimum time gap between any two selected resources of the selected sidelink grant in case that PSFCH is configured for this pool of resources, and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.1 of TS 38.212 [9];

2> else if the selected resource pool is SL-PRS dedicated resource pool:

3> randomly select the time and frequency resource from the resources indicated by the physical layer as specified in clause 8.2.4 of TS 38.214 [7] for either the removed resource or the dropped resource, according to the selected number of SL-PRS retransmissions and the remaining SL-PRS delay budget for SL-PRS transmission and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.2 of TS 38.212 [9].

2> replace the removed or dropped resource(s) by the selected resource(s) for the selected sidelink grant.

1> if any resource(s) of the selected sidelink grant which has been indicated by a prior SCI is indicated for pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]:

2> remove the resource(s) from the selected sidelink grant associated to the Sidelink process;

2> if one or multiple SL DRX is configured:

3> if the selected resource pool is not SL-PRS dedicated resource pool:

4> randomly select the time and frequency resource from the resources later than the resources for either the removed resource or the dropped resource indicated by a prior SCI, from the resource indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] which occur within the SL DRX active time as specified in clause 5.28.3 of the destination UE selected for indicating to the physical layer the SL DRX active time above, according to the amount of selected frequency resources, the selected number of HARQ retransmissions and the remaining PDB of either SL data available in the logical channel(s) by ensuring the minimum time gap between any two selected resources of the selected sidelink grant in case that PSFCH is configured for this pool of resources, and the remaining SL-PRS delay budget for SL-PRS transmission, if available, and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.1 of TS 38.212 [9].

2> else:

3> if the selected resource pool is not SL-PRS dedicated resource pool:

4> randomly select the time and frequency resource from the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] for either the removed resource or the dropped resource, according to the amount of selected frequency resources, the selected number of HARQ retransmissions and the remaining PDB of either SL data available in the logical channel(s) by ensuring the minimum time gap between any two selected resources of the selected sidelink grant in case that PSFCH is configured for this pool of resources, and the remaining SL-PRS delay budget for SL-PRS transmission, if available, and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.1 of TS 38.212 [9].

3> else if the selected resource pool is SL-PRS dedicated resource pool:

4> randomly select the time and frequency resource from the resources indicated by the physical layer as specified in clause 8.2.4 of TS 38.214 [7] for either the removed resource or the dropped resource, according to the selected number of SL-PRS retransmissions and the remaining SL-PRS delay budget for SL-PRS transmission and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.1 of TS 38.212 [9].

NOTE 2: 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.

2> replace the removed or dropped resource(s) by the selected resource(s) for the selected sidelink grant.

NOTE 3: It is left for UE implementation to reselect any pre-selected but not reserved resource(s) other than the resource(s) indicated for pre-emption or re-evaluation by the physical layer during reselection triggered by re-evaluation or pre-emption indicated by the physical layer.

NOTE 4: It is up to UE implementation whether to set the resource reservation interval in the re-selected resource to replace pre-empted resource.

NOTE 5: It is up to UE implementation whether to trigger resource reselection due to de-prioritization as specified in clause 16.2.4 of TS 38.213 [6], clause 5.14.1.2.2 of TS 36.321 [22] and clause 5.22.1.3.1a.

NOTE 6: For the selected sidelink grant corresponds to transmissions of multiple MAC PDU, it is up to UE implementation whether to apply re-evaluation check to the resources in non-initial reservation period that have been signalled neither in the immediate last nor in the current period.

================================NEXT CHANGE=======================================

5.22.1.2b Re-selection for using a received resource conflict indication

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

1> if *sl-interUECoordinationScheme2* enabling reception/transmission of a resource conflict indication is configured by RRC; and

1> if the next resource of the selected sidelink grant which has been indicated by a prior SCI is overlapped with conflict resource(s) indicated by the physical layer as specified in clause 16.3.1 of TS 38.213 [6]:

2> remove the resource from the selected sidelink grant associated to the Sidelink process;

2> randomly select the time and frequency resource from the resources indicated by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] excluding the conflict resource(s) for the removed resource, according to the amount of selected frequency resources, the selected number of HARQ retransmissions and the remaining PDB of either SL data available in the logical channel(s), and the remaining SL-PRS delay budget for SL-PRS transmission, if available, by ensuring the minimum time gap between any two selected resources of the selected sidelink grant in case that PSFCH is configured for this pool of resources, and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.1 of TS 38.212 [9];

NOTE 1: If retransmission resource cannot be selected by ensuring that the resource can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resource for 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.

2> replace the removed resource by the selected resource for the selected sidelink grant.

NOTE 2: It is left for UE implementation to reselect any pre-selected but not reserved resource(s) other than the resource overlapping with the conflict resource(s) indicated by the physical layer during reselection triggered by the conflict resource(s) indicated by the physical layer.

NOTE 3: It is up to UE implementation whether and how to set the resource reservation interval in the re-selected resource to replace the resource overlapping with the conflict resource(s) indicated by the physical layer.

================================NEXT CHANGE=======================================

5.22.1.3 Sidelink HARQ operation and SL-PRS transmission

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 an *sl-PeriodCG* of the configured sidelink grant; or

1> if the sidelink grant is a dynamic sidelink grant or selected sidelink grant and no MAC PDU has been obtained in the previous sidelink grant when PSCCH duration(s) and 2nd stage SCI on PSSCH of the previous sidelink grant is not in SL DRX Active time as specified in clause 5.28.3 of any destination that has data to be sent:

NOTE 1: Void.

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

2> if all PSCCH duration(s) and PSSCH duration(s) for initial transmission of a MAC PDU of the dynamic sidelink grant or the configured sidelink grant is not in SL DRX Active time as specified in clause 5.28.3 of the destination that has data to be sent:

3> ignore the sidelink grant.

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

2> else:

3> obtain the MAC PDU and SL-PRS, if any, 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> if the MAC PDU is for NR sidelink discovery:

6> set the cast type indicator to broadcast.

5> else:

6> 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 MAC CE(s), if included, in the MAC PDU and SL-PRS, if any;

NOTE 3A: When determining Sidelink transmission information, the priority of the Sidelink Inter-UE Coordination Information MAC CE is the value configured in RRC parameters *sl-PriorityCoordInfoCondition* when triggered by a condition, or *sl-PriorityCoordInfoExplicit* when triggered by an explicit request. When determining Sidelink transmission information, the priority of the Sidelink Inter-UE Coordination Request MAC CE is the value configured in RRC parameter *sl-PriorityRequest*. When determining Sidelink transmission information, the priority of the Sidelink Inter-UE Coordination Information MAC CE is the value indicated in Priority field in the Sidelink Inter-UE Coordination Request MAC CE provided by the UE when triggered by an explicit request, if *sl-PriorityCoordInfoExplicit-r17* is not configured. When determining Sidelink transmission information for performing sensing and candidate resource selections in PHY, the priority value of the Sidelink Inter-UE Coordination Information MAC CE triggered under a condition is up to UE implementation, if *sl-PriorityCoordInfoCondition-r17* is not configured. When determining Sidelink transmission information for performing sensing and candidate resource selections in PHY, the priority value of Sidelink Inter-UE Coordination Request MAC CE is the same as that of a TB to be transmitted by the UE, if *sl-PriorityRequest-r17* is not configured.

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.

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].

5> set the Redundancy version to the selected value.

5> if the sidelink grant is associated with request from the higher layer for triggering the SL-PRS transmission of the peer UE identified by the Destination layer-2 ID:

6> set the SL-PRS request to *request*.

5> set the SL-PRS resource ID to *[the value of the field]*, if available, within Sidelink transmission information.

4> deliver the MAC PDU, the SL-PRS, if available, 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; or

2> if PSCCH duration(s) and PSSCH duration(s) for one or more retransmissions of a MAC PDU of the dynamic sidelink grant or the configured sidelink grant is not in SL DRX Active time as specified in clause 5.28.3 of the destination that has data to be sent:

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 and the SL-PRS, if available, to the associated Sidelink process;

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

================================NEXT 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.

Priority of a MAC PDU and SL-PRS, if available, is determined by the highest priority of the logical channel(s),MAC CE(s) in the MAC PDU or SL-PRS.

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 for 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 and SL-PRS, if avaliable:

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 and SL-PRS, if avaliable, 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 and SL-PRS, if avaliable, according to clause 5.22.1.3.2:

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

The transmission of the MAC PDU or SL-PRS, if available, is prioritized over uplink transmission(s) 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 transmission(s) at the time of the transmission, and

1> if none of the uplink transmission(s) is prioritized by upper layer according to TS 23.287 [19], and

1> if none of the NR uplink MAC PDU(s) includes any MAC CE prioritized as described in clause 5.4.3.1.3, and

1> if *ul-PrioritizationThres* is configured and if the value of the highest priority of logical channel(s) of all the NR uplink transmission(s) is not lower than *ul-PrioritizationThres*, and

1> if *sl-PrioritizationThres* is configured and if the value of the highest priority of logical channel(s) or MAC CE(s) 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 CHANGE=======================================

5.22.1.3.xx Processing of sidelink grant on SL-PRS dedicated resource pool

For each sidelink grant, the MAC 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 an *sl-PeriodCG* of the configured sidelink grant:

2> associate a Sidelink process to this sidelink grant;

2> set the Destination ID to the Destination layer-2 ID corresponding to the SL-PRS transmission;

2> if *[12bitSourceID]* is configured:

3> set the Source ID to the 12 LSB of the Source layer-2 ID corresponding to the SL-PRS transmission;

2> else if *[24bitSourceID]* is configured:

3> set the Source ID to the Source layer-2 ID corresponding to the SL-PRS transmission;

2> set the cast type indicator to one of broadcast, groupcast and unicast as indiated by the upper layer;

2> set the SL-PRS priority as the value indicated by upper layer;

2> set the SL-PRS resource ID;

2> if the higher layer triggers SL-PRS transmission to the peer UE identified by the Destination layer-2 ID:

3> set the SL-PRS request to *request*;

2> deliver the SL-PRS transmission information to the Sidelink process;

2> instruct the associated Sidelink process to trigger a new transmission as defined in 5.22.1.3.xxa.

1> else (i.e. retransmission):

2> identify the Sidelink process associated with this grant;

2> if *sl-PRS-MaxNumTransmissions* is configured and the number of transmissions of the SL-PRS has not reached *sl-PRS-MaxNumTransmissions*:

3> deliver the same SL-PRS transmission information as the initial transmission to the Sidelink process;

3> instruct the associated Sidelink process to trigger a retransmission as defined in 5.22.1.3.xxa.

NOTE: For configured sidelink grant, the Sidelink process for retransmission is identified by the SL-PRS process ID as specified in clause 5.22.1.3.1.

================================NEXT CHANGE=======================================

5.22.1.3.xxa Sidelink process associated with SL-PRS dedicated resource pool

If the Sidelink process is configured to perform transmissions of multiple SL-PRS with Sidelink resource allocation scheme 2, the process maintains a counter *SL\_RESOURCE\_RESELECTION\_COUNTER*. For other configurations of the Sidelink process, this counter is not available.For each SL-PRS new transmission or retransmission, the MAC entity shall:

1> if there is no uplink transmission; or

1> if there is uplink transmission and the sidelink transmission is prioritized over uplink transmission:

2> instruct the physical layer to transmit SCI of the SL grant with the associated SL-PRS transmission information on SL-PRS dedicated resource pool;

2> instruct the physical layer to generate the SL-PRS on SL-PRS dedicated resource pool.

1> if this transmission corresponds to the last transmission of the SL-PRS transmission:

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

The transmission of the SL-PRS is prioritized over uplink transmission(s) 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 transmission(s) at the time of the transmission, and

1> if *ul-PrioritizationThres* is configured and if the value of the highest priority of logical channel(s) of all the NR uplink transmission(s) is not lower than *ul-PrioritizationThres*, and

1> if *sl-PrioritizationThres* is configured and if the value of SL-PRS priority is lower than *sl-PrioritizationThres*.

================================NEXT CHANGE=======================================

5.22.1.4 Multiplexing and assembly

5.22.1.4.1 Logical channel prioritization

5.22.1.4.1.2 Selection of logical channels and SL-PRS

The MAC entity shall for each SCI corresponding to a new transmission:

1> if *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* is configured according to TS 38.331 [5]; and

1> if the new transmission is not associated to a sidelink grant on SL-PRS dedicated resource pool:

2> if the new transmission is associated to a sidelink grant in *sl-DiscTxPoolSelected* or *sl-DiscTxPoolScheduling* configured in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*:

3> select a Destination associated with NR sidelink discovery as specified in TS 23.304 [26], that is in the SL Active time for the SL transmission occasion if SL DRX is applied for the destination, and among the logical channels that satisfy all the following conditions for the SL grant associated to the SCI:

4> SL data for NR sidelink discovery is available for transmission; and

4> *SBj* > 0, in case there is any logical channel having *SBj* > 0; and

4> *sl-configuredGrantType1Allowed*, if configured, is set to *true* in case the SL grant is a Configured Grant Type 1; and

4> *sl-AllowedCG-List*, if configured, includes the configured grant index associated to the SL grant.

2> else:

3> select a Destination associated to one of unicast, groupcast and broadcast (excluding the Destination(s) associated with NR sidelink discovery as specified in TS 23.304 [26]), that is in the SL Active time for the SL transmission occasion if SL DRX is applied for the destination, and having at least one of the MAC CE and the logical channel and pending SL-PRS transmission(s)with the highest priority, among the logical channels that satisfy all the following conditions and MAC CE(s), if any, and SL-PRS(s), if any for the SL grant associated to the SCI:

4> SL data for NR sidelink communication is available for transmission; and

4> *SBj* > 0, in case there is any logical channel having *SBj* > 0; and

4> *sl-configuredGrantType1Allowed*, if configured, is set to *true* in case the SL grant is a Configured Grant Type 1; and

4> *sl-AllowedCG-List*, if configured, includes the configured grant index associated to the SL grant; and

4> *sl-HARQ-FeedbackEnabled* is set to *disabled*, if PSFCH is not configured for the SL grant associated to the SCI.

1> else if *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* is not configured according to TS 38.331 [5]; and

1> if the new transmission is not associated to a sidelink grant on SL-PRS dedicated resource pool:

2> select a Destination associated to one of unicast, groupcast and broadcast, that is in the SL Active time for the SL transmission occasion if SL DRX is applied for the destination, and having at least one of the MAC CE and the logical channel and pending SL-PRS transmission(s) with the highest priority, among the logical channels that satisfy all the following conditions and MAC CE(s), if any, and SL-PRS(s), if any, for the SL grant associated to the SCI:

3> SL data is available for transmission; and

3> *SBj* > 0, in case there is any logical channel having *SBj* > 0; and

3> *sl-configuredGrantType1Allowed*, if configured, is set to *true* in case the SL grant is a Configured Grant Type 1; and

3> *sl-AllowedCG-List*, if configured, includes the configured grant index associated to the SL grant; and

3> *sl-HARQ-FeedbackEnabled* is set to *disabled*, if PSFCH is not configured for the SL grant associated to the SCI.

NOTE 1: If multiple Destinations have the logical channels satisfying all conditions above with the same highest priority or if multiple Destinations have either the MAC CE and/or the logical channels satisfying all conditions above with the same priority as the MAC CE, which Destination is selected among them is up to UE implementation.

1> else: (i.e., the sidelink grant is associated with SL-PRS dedicated resource pool)

2> select a Destination corresponding to the cast type of the SL grant and having pending SL-PRS transmission(s) with the highest priority for the SL grant associated to the SCI.

1> select the logical channels satisfying all the following conditions among the logical channels belonging to the selected Destination when the UL grant is not associated to a sidelink grant on SL-PRS dedicated resource pool:

2> SL data is available for transmission; and

2> *sl-configuredGrantType1Allowed*, if configured, is set to *true* in case the SL grant is a Configured Grant Type 1; and.

2> *sl-AllowedCG-List*, if configured, includes the configured grant index associated to the SL grant; and

2> *sl-HARQ-FeedbackEnabled* is set to the value that satisfies the following conditions:

3> if PSFCH is configured for the sidelink grant associated to the SCI and the UE is capable of PSFCH reception:

4> *sl-HARQ-FeedbackEnabled* is set to *enabled*, if *sl-HARQ-FeedbackEnabled* is set to *enabled* for the highest priority logical channel satisfying the above conditions; or

4> *sl-HARQ-FeedbackEnabled* is set to *disabled*, if *sl-HARQ-FeedbackEnabled* is set to *disabled* for the highest priority logical channel satisfying the above conditions.

3> else:

4> *sl-HARQ-FeedbackEnabled* is set to disabled.

NOTE 2: HARQ feedback enabled/disabled indicator is set to disabled for the transmission of a MAC PDU only carrying CSI reporting MAC CE or Sidelink DRX Command MAC CE or Sidelink Inter-UE Coordination Request MAC CE or Sidelink Inter-UE Coordination Information MAC CE.

================================NEXT CHANGE=======================================

5.22.1.4.1.3 Allocation of sidelink resources

The MAC entity shall for each sidelink grant associated with SL-PRS shared resource pool:

1> if there is SL-PRS pending for transmission for the selected destination; and

2> if all the SL-SCH data within logical channel with lower priority value than that of the SL-PRS can be allocated with resources when SL-PRS is transmitted:

3> determine that the pending SL-PRS can be transmitted in the sidelink grant.

2> derive the Transport Block Size for a new transmission for SL-SCH according to clause 8.1.3.2 in TS 38.214 [7].

The MAC entity shall for each SCI corresponding to a new transmission for SL-SCH:

1> allocate resources to the logical channels as follows:

2> logical channels selected in clause 5.22.1.4.1.2 for the SL grant with *SBj* > 0 are allocated resources in a decreasing priority order. If the sPBR of a logical channel is set to *infinity*, the MAC entity shall allocate resources for all the data that is available for transmission on the logical channel before meeting the sPBR of the lower priority logical channel(s);

2> decrement *SBj* by the total size of MAC SDUs served to logical channel *j* above;

2> if any resources remain, all the logical channels selected in clause 5.22.1.4.1.2 are served in a strict decreasing priority order (regardless of the value of *SBj*) until either the data for that logical channel or the SL grant is exhausted, whichever comes first. Logical channels configured with equal priority should be served equally.

NOTE 1: The value of *SBj* can be negative.

The UE shall also follow the rules below during the SL scheduling procedures above:

- the UE should not segment an RLC SDU (or partially transmitted SDU or retransmitted RLC PDU) if the whole SDU (or partially transmitted SDU or retransmitted RLC PDU) fits into the remaining resources of the associated MAC entity;

- if the UE segments an RLC SDU from the logical channel, it shall maximize the size of the segment to fill the grant of the associated MAC entity as much as possible;

- the UE should maximise the transmission of data;

- if the MAC entity is given a sidelink grant size that is equal to or larger than 12 bytes while having data available and allowed (according to clause 5.22.1.4.1) for transmission, the MAC entity shall not transmit only padding;

- A logical channel configured with *sl-HARQ-FeedbackEnabled* set to *enabled* and a logical channel configured with *sl-HARQ-FeedbackEnabled* set to *disabled* cannot be multiplexed into the same MAC PDU.

The MAC entity shall not generate a MAC PDU for the HARQ entity if the following conditions are satisfied:

- there is no Sidelink CSI Reporting MAC CE generated for this PSSCH transmission as specified in clause 5.22.1.7; and

- there is no Sidelink DRX Command MAC CE generated for this PSSCH transmission as specified in clause 5.22.1.8; and

- there is no Sidelink Inter-UE Coordination Request MAC CE generated for this PSSCH transmission as specified in clause 5.22.1.9; and

- there is no Sidelink Inter-UE Coordination Information MAC CE generated for this PSSCH transmission as specified in clause 5.22.1.10; and

- the MAC PDU includes zero MAC SDUs and the MAC PDU is not associated SL-PRS transmission on SL-PRS shared resource pool.

Logical channels shall be prioritised in accordance with the following order (highest priority listed first):

- data from SCCH;

- Sidelink CSI Reporting MAC CE;

- Sidelink Inter-UE Coordination Request MAC CE and Sidelink Inter-UE Coordination Information MAC CE;

- Sidelink DRX Command MAC CE;

- data from any STCH or SL-PRS.

NOTE 2: The priority order between Sidelink Inter-UE Coordination Request MAC CE and Sidelink Inter-UE Coordination Information MAC CE is up to UE implementation.

5.22.1.4.2 Multiplexing of MAC Control Elements and MAC SDUs

The MAC entity shall multiplex MAC CEs and MAC SDUs in a MAC PDU according to clauses 5.22.1.4.1 and 6.1.6.

================================NEXT CHANGE=======================================

5.22.1.5 Scheduling Request

In addition to clause 5.4.4, the Scheduling Request (SR) is also used for requesting SL-SCH resources for new transmission when triggered by the Sidelink BSR (clause 5.22.1.6) or the SL-CSI reporting (clause 5.22.1.7) or SL-DRX Command indication or SL-PRS Resource Request (clause 6.1.3.xx). If configured, the MAC entity performs the SR procedure as specified in this clause unless otherwise specified in clause 5.4.4. For a sidelink logical channel or for SL-CSI reporting or for SL-DRX Command indication or for SL-PRS Resource Request, at most one PUCCH resource for SR is configured per UL BWP.

The SR configuration of the logical channel that triggered the Sidelink BSR (clause 5.22.1.6) is also considered as corresponding SR configuration for the triggered SR (clause 5.4.4). The value of the priority of the triggered SR corresponds to the value of priority of the logical channel that triggered the SR.

Each sidelink logical channel may be mapped to zero or one SR configuration, which is configured by RRC. If the SL-CSI reporting procedure is enabled by RRC, the SL-CSI reporting is mapped to one SR configuration for all PC5-RRC connections. The SR configuration of the SL-CSI reporting triggered according to 5.22.1.7 is considered as corresponding SR configuration for the triggered SR (clause 5.4.4). The value of the priority of the triggered SR triggered by SL-CSI reporting corresponds to the value of the priority of the Sidelink CSI Reporting MAC CE. The SR configuration of the SL-CSI reporting is considered as corresponding SR configuration for the triggered SR of SL-DRX Command indication triggered according to 5.28.3. The value of the priority of the triggered SR triggered by SL-DRX Command indication corresponds to the value of the priority of the Sidelink DRX Command MAC CE. Each SL-PRS priority may be mapped to zero or one SR configuration, which is configured by RRC. The value of the priority of the triggered SR triggered by SL-PRS resource request corresponds to the value of the priority of the SL-PRS triggering the SL-PRS Resource Request MAC CE.

All pending SR(s) triggered according to the Sidelink BSR procedure (clause 5.22.1.6) prior to the MAC PDU assembly shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the MAC PDU is transmitted and this PDU includes an SL-BSR MAC CE which contains buffer status up to (and including) the last event that triggered a Sidelink BSR (see clause 5.22.1.4) prior to the MAC PDU assembly.

All pending SR(s) triggered according to the Sidelink BSR procedure (clause 5.22.1.6) shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the SL grant(s) can accommodate all pending data available for transmission in sidelink.

The pending SR triggered according to the SL-CSI reporting for a destination shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the SL grant(s) can accommodate the Sidelink CSI Reporting MAC CE when the SL-CSI reporting that has been triggered but not cancelled or when the triggered SL-CSI reporting is cancelled due to latency non-fulfilment as specified in 5.22.1.7. The pending SR triggered according to the SL-DRX Command indication for a destination shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the SL grant(s) can accommodate the Sidelink DRX Command MAC CE when the SL-DRX Command indication that has been triggered but not cancelled. All pending SR(s) triggered by either Sidelink BSR or Sidelink CSI report or Sidelink DRX Command indication shall be cancelled, when RRC configures Sidelink resource allocation mode 2.

All pending SR(s) triggered according to the SL-PRS Resource Request procedure (clause 5.22.1.xx) prior to the MAC PDU assembly shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the MAC PDU is transmitted and this PDU includes an SL-PRS Resource Request MAC CE which contains status of the pending SL-PRS transmission(s) up to (and including) the last event that triggered a SL-PRS Resource Request (see clause 5.22.1.xx) prior to the MAC PDU assembly.

All pending SR(s) triggered according to the SL-PRS Resource Request procedure (clause 5.22.1.xx) shall be cancelled and each respective *sr-ProhibitTimer* shall be stopped when the SL grant(s) can accommodate the all the pending SL-PRS transmission(s).

================================NEXT CHANGE=======================================

#### 5.22.1.xx SL-PRS Resource Request

SL-PRS transmission can be triggered either by lower layer signalling from the peer UE or the UE’s own higher layer. The SL-PRS Resource Request procedure is used to provide gNB with information about the triggered SL-PRS transmission.

The MAC entity shall, if Sidelink resource allocation scheme 1 for SL-PRS transmission is configured:

1> if aperiodic SL-PRS is triggered:

2> trigger the SL-PRS Resource Request.

1> else if periodic SL-PRS is triggered:

2> notify RRC to send SL-PRS Resource Request.

The MAC entity shall:

1> if SL-PRS Resource Request is triggered and not cancelled:

2> if UL-SCH resources are available for a new transmission and these UL-SCH resources can accommodate the SL-PRS Resource Request MAC CE plus its subheader as a result of logical channel prioritization:

3> instruct the Multiplexing and Assembly entity to generate the SL-PRS Resource Request MAC CE.

2> else:

3> trigger a Scheduling Request for the SL-PRS Resource Request MAC CE as specified in clause 5.4.4.

The SL-PRS Resource Request MAC CE may be cancelled when SL grant can accommodate all the pending SL-PRS transmissions. The SL-PRS Resource Request MAC CE shall be cancelled when a MAC PDU is transmitted and this PDU includes a SL-PRS Resource Request MAC CE that indicates request for all the pending SL-PRS transmission(s) since the last event the MAC CE is triggered.

================================NEXT CHANGE=======================================

5.22.2 SL-SCH Data and SL-PRS reception

5.22.2.1 SCI reception

SCI indicates if there is a transmission on SL-SCH and provide the relevant HARQ information. SCI can also indicate if there is a SL-PRS transmission. An SCI for SL-SCH transmission with or without corresponding SL-PRS on SL-PRS shared resource pool consists of two parts: the 1st stage SCI on PSCCH and the 2nd stage SCI on PSSCH as specified in clause 8.1 of TS 38.214 [7]. An SCI for SL-PRS transmission on SL-PRS dedicated resource pool consists of a single part on PSCCH as specified in TS 38.212 [9].

The MAC entity shall:

1> for each PSCCH duration during which the MAC entity monitors PSCCH:

2> if a 1st stage SCI has been received on the PSCCH:

3> determine the set of PSSCH durations in which reception of a 2nd stage SCI and the transport block occur using the received part of the SCI;

3> if the 2nd stage SCI for this PSSCH duration has been received on the PSSCH:

4> store the SCI as a valid SCI for the PSSCH durations corresponding to transmission(s) of the transport block and SL-PRS, if available and the associated HARQ information and QoS information;

2> else if an SCI has been received on the PSCCH reception on SL-PRS dedicated resource pool for SL-PRS transmission:

3> determine the SL-PRS transmission occasion corresponding to the SCI;

3> store the SCI as a valid SCI for the SL-PRS transmission and the corresponding SL-PRS transmission information on SL-PRS dedicated resource pool.1> for each PSSCH duration for which the MAC entity has a valid SCI:

2> deliver the SCI and the associated Sidelink transmission information to the Sidelink HARQ Entity.

1> for each SL-PRS transmission occasion for which MAC entity has a valid SCI:

2> perform SL-PRS reception according to the SL-PRS transmission information within the SCI as in clause 5.22.2.2.2 for SL-PRS received on SL-PRS shared resource pool and as in clause 5.22.2.x for SL-PRS received on SL-PRS dedicated resource pool.

================================NEXT CHANGE=======================================

5.22.2.2 Sidelink HARQ operation and SL-PRS reception on SL-PRS shared resource pool

5.22.2.2.1 Sidelink HARQ Entity

There is at most one Sidelink HARQ Entity at the MAC entity for reception of the SL-SCH, which maintains a number of parallel Sidelink processes.

Each Sidelink process is associated with SCI in which the MAC entity is interested. This interest is determined by the Sidelink identification information of the SCI. The Sidelink HARQ Entity directs Sidelink transmission information and associated TBs received on the SL-SCH to the corresponding Sidelink processes.

The number of Receiving Sidelink processes associated with the Sidelink HARQ Entity is defined in TS 38.306 [5].

For each PSSCH duration, the Sidelink HARQ Entity shall:

1> for each SCI valid for this PSSCH duration:

2> if the NDI has been toggled compared to the value of the previous received transmission corresponding to the Sidelink identification information and the Sidelink process ID of the SCI or this is the very first received transmission for the pair of the Sidelink identification information and the Sidelink process ID of the SCI:

3> if there is a Sidelink process associated with the Sidelink identification information and the Sidelink process ID of the SCI:

4> consider the Sidelink process as unoccupied;

4> flush the soft buffer for the Sidelink process.

3> allocate the TB received from the physical layer and the associated Sidelink identification information and Sidelink process ID to an unoccupied Sidelink process;

3> associate the Sidelink process with the Sidelink identification information and the Sidelink process ID of this SCI and consider this transmission to be a new transmission.

NOTE 1: When a new TB arrives, the Sidelink HARQ Entity allocates the TB to any unoccupied Sidelink process. If there is no unoccupied Sidelink process in the Sidelink HARQ entity, how to manage receiving Sidelink processes is up to UE implementation.

NOTE 1a: If the NDI has not been toggled compared to the value of the previous received transmission corresponding to the Sidelink identification information and the Sidelink process ID of the SCI, and if there is no Sidelink process associated with the Sidelink identification information and the Sidelink process ID of the SCI, it is up to UE implementation to handle the corresponding TB.

1> for each Sidelink process:

2> if the NDI has not been toggled compared to the value of the previous received transmission corresponding to the Sidelink identification information and the Sidelink process ID of the SCI for the Sidelink process according to its associated SCI:

3> allocate the TB received from the physical layer to the Sidelink process and consider this transmission to be a retransmission.

NOTE 2: A single sidelink process can only be (re-)associated to a single combination of Sidelink identification information and Sidelink process ID at a time and a single combination of Sidelink identification information and Sidelink process ID can only be (re-)associated to a single sidelink process at a time.

5.22.2.2.2 Sidelink process

For each PSSCH duration where a transmission takes place for the Sidelink process, one TB and the associated HARQ information is received from the Sidelink HARQ Entity.

For each received TB and SL-PRS, if available and associated Sidelink transmission information, the Sidelink process shall:

1> if this is a new transmission:

2> attempt to decode the received data.

1> else if this is a retransmission:

2> if the data for this TB has not yet been successfully decoded:

3> instruct the physical layer to combine the received data with the data currently in the soft buffer for this TB and attempt to decode the combined data.

1> if the sidelink transmission information in the SCI indicates SL-PRS transmission:

2> if the SL-PRS transmission is associated to unicast:

3> if the DST field of the decoded MAC PDU subheader is equal to the 8 MSB of any of the Source Layer-2 ID(s) of the UE for which the 16 LSB are equal to the Destination ID in the corresponding SCI; and

3> if the SRC field of the decoded MAC PDU subheader is equal to the 16 MSB of any of the Destination Layer-2 ID(s) of the UE for which the 8 LSB are equal to the Source ID in the corresponding SCI:

4> instruct the physical layer to perform SL-PRS reception.

2> else if the SL-PRS tnramission is associated with groupcast or broadcast:

3> if the DST field of the decoded MAC PDU subheader is equal to the 8 MSB of any of the Destination Layer-2 ID(s) of the UE for which the 16 LSB are equal to the Destination ID in the corresponding SCI:

4> instruct the physical layer to perform SL-PRS reception.

1> if the data which the MAC entity attempted to decode was successfully decoded for this TB; or

1> if the data for this TB was successfully decoded before:

2> if this is the first successful decoding of the data for this TB:

3> if this TB is associated to unicast and the DST field of the decoded MAC PDU subheader is equal to the 8 MSB of any of the Source Layer-2 ID(s) of the UE for which the 16 LSB are equal to the Destination ID in the corresponding SCI:

4> if the SRC field of the decoded MAC PDU subheader is equal to the 16 MSB of any of the Destination Layer-2 ID(s) of the UE for which the 8 LSB are equal to the Source ID in the corresponding SCI; or

4> if this TB is corresponding to the logical channel with LCID equal to 0 or 1 and determined to be the first TB:

5> deliver the decoded MAC PDU to the disassembly and demultiplexing entity.

3> if this TB is associated to groupcast or broadcast:

4> if the DST field of the decoded MAC PDU subheader is equal to the 8 MSB of any of the Destination Layer-2 ID(s) of the UE for which the 16 LSB are equal to the Destination ID in the corresponding SCI; or

4> if this TB is corresponding to the logical channel with LCID equal to 58, and the DST field of the decoded MAC PDU subheader is equal to the 8 MSB of any of the Source Layer-2 ID(s) of the UE for which the 16 LSB are equal to the Destination ID in the corresponding SCI:

5> deliver the decoded MAC PDU to the disassembly and demultiplexing entity.

NOTE: Whether the TB is the first TB can be determined based on the Source Layer-2 ID and Destination Layer-2 ID pair.

2> consider the Sidelink process as unoccupied.

1> else:

2> instruct the physical layer to replace the data in the soft buffer for this TB with the data which the MAC entity attempted to decode.

1> if HARQ feedback is enabled by the SCI:

2> if negative-only acknowledgement is indicated by the SCI according to clause 8.4.1 of TS 38.212 [9]:

3> if UE's location information is available and distance beteween UE's location and the central location of the nearest zone that is calculated based on the *Zone\_id* in the SCI and the value of *sl-ZoneLength* corresponding to the communication range requirement in the SCI as specified in TS 38.331 [5] is smaller or equal to the communication range requirement in the SCI; or

3> if none of *Zone\_id* and communication range requirement is indicated by the SCI; or

3> if UE's location information is not available:

4> if the data which the MAC entity attempted to decode was not successfully decoded for this TB and the data for this TB was not successfully decoded before:

5> instruct the physical layer to generate a negative acknowledgement of the data in this TB.

2> if negative-positive acknowledgement or unicast is indicated by the SCI according to clause 8.4.1 of TS 38.212 [9]:

3> if the data which the MAC entity attempted to decode was successfully decoded for this TB or the data for this TB was successfully decoded before:

4> instruct the physical layer to generate a positive acknowledgement of the data in this TB.

3> else:

4> instruct the physical layer to generate a negative acknowledgement of the data in this TB.

================================NEXT CHANGE=======================================

#### 5.22.2.x SL-PRS reception on SL-PRS dedicated resource pool

For each SL-PRS transmission occasion on SL-PRS dedicated resource pool, the MAC entity shall:

1> if this SL-PRS transmission is associated to unicast:

2> if the destination ID in the corresponding SCI is equal to the UE's source ID; and if *[12bitSourceID]* is configured:

3> if source ID in the corresponding SCI is equal to the 12 LSB of the UE's destination layer-2 ID:

4> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion.

2> else if the destination ID in the corresponding SCI is equal to the UE's source ID, and if *[24bitSourceID]* is configured:

3> if source ID in the corresponding SCI is equal to the UE's destination layer-2 ID:

4> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion.

1> else if this SL-PRS transmission is associated to broadcast or groupcast:

2> if the destination ID in the corresponding SCI is equal to the UE's destination layer-2 ID

3> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion.

================================NEXT CHANGE=======================================

5.26 Positioning SRS transmission in RRC\_INACTIVE

5.26.1 General

Periodic and semi-persistent Positioning SRS with or without positioning SRS bandwidth aggregation can be configured for Positioning SRS transmission in RRC\_INACTIVE.

SRS for positioning Tx frequency hopping as in clause 5.xx can also be configured for Positioning SRS transmission in RRC\_INACTIVE.

The MAC entity shall,

1> if the TA of the configured Positioning SRS is valid according to clause 5.26.2, and the conditions for positioning SRS transmission in clause 7.3.1 of TS 38.213 [6] and clause 6.2.1.4 of TS 38.214 [7] are satisfied:

2> if the UE is configured with UTW and the *UplinkTimeWindowTimer* is running according to clause 5.xx; or

2> if the UE is not configured with UTW:

3> instruct to the lower layer according to TS 38.214 [7] to transmit Positioning Periodic SRS or Semi-Persistent SRS that is activated according to clause 5.18.17.

5.26.2 TA validation for SRS transmission in RRC\_INACTIVE

RRC configures the following parameters for validation for SRS transmission in RRC\_INACTIVE:

- *inactivePosSRS-RSRP-ChangeThreshold*: RSRP threshold for the increase/decrease of RSRP for time alignment validation.

The MAC entity shall:

1> if the UE receives configuration for SRS transmission in RRC\_INACTIVE:

2> store the RSRP of the downlink pathloss reference with the current RSRP value of the downlink pathloss reference as in TS 38.331 [5].

1> else if the UE is configured with SRS transmission in RRC\_INACTIVE:

2> if Timing Advance Command MAC CE is received as in clause 5.2, or;

2> if Timing Advance Command or Absolute Timing Advance Command is received for Random Access procedure that is successfully completed:

3> update the stored the RSRP of the downlink pathloss reference with the current RSRP value of the downlink pathloss reference.

2> if the UE is configured with SRS with validity area and the upper layer indicates the MAC to update the stored RSRP:

3> store the RSRP of the downlink pathloss reference with the current RSRP value of the downlink pathloss reference of the camped cell as specified in TS 38.331 [5].

The MAC entity shall consider the TA to be valid when the following conditions are fulfilled:

1> compared to the stored downlink pathloss reference RSRP value, the current RSRP value of the downlink pathloss reference has not increased/decreased by more than *inactivePosSRS-RSRP-ChangeThreshold*, if configured; and

1> *inactivePosSRS-TimeAlignmentTimer* is running or *srs-ValidityArea-TimerAlignmentTimer* is running when positioning validity area is configured.

================================NEXT CHANGE=======================================

5.28 Sidelink Discontinuous Reception (DRX)

5.28.1 General

The MAC entity may be configured by RRC with an SL DRX functionality that controls the UE's SCI (i.e., 1st stage SCI and 2nd stage SCI) monitoring activity for unicast, groupcast and broadcast. When using SL DRX operation, the MAC entity shall also monitor SCI (i.e., 1st stage SCI and 2nd stage SCI) according to requirements found in other clauses of this specification.

Sidelink DRX and UE procedure on SL-PRS dedicated resource pool are not applied at the same time.

RRC controls Sidelink DRX operation by configuring the following parameters:

- *sl-drx-onDurationTimer*/*sl-DRX-GC-BC-OndurationTimer*: the duration at the beginning of an SL DRX cycle;

- *sl-drx-SlotOffset*: the delay before starting the *sl-drx-onDurationTimer*/*sl-DRX-GC-BC-OndurationTimer*;

- *sl-drx-InactivityTimer*/*sl-DRX-GC-InactivityTimer* (except for the SL broadcast communication): the duration after the first slot of SCI (i.e., 1st stage SCI and 2nd stage SCI) reception in which an SCI indicates a new SL transmission for the MAC entity;

- *sl-drx-RetransmissionTimer*/*sl-DRX-GC-RetransmissionTimer* (per Sidelink process except for the SL broadcast process): the maximum duration until an SL retransmission is received;

- *sl-drx-StartOffset*: the slot where the SL DRX cycle starts;

- *sl-drx-Cycle*/*sl-DRX-GC-BC-Cycle*: the Sidelink DRX cycle;

- *sl-drx-HARQ-RTT-Timer*/*sl-DRX-GC-HARQ-RTT-Timer* (per Sidelink process except for the SL broadcast process): the minimum duration before an SL HARQ retransmission is expected by the MAC entity.

===================================NEXT CHANGE=====================================

## 5.xx SRS for positioning Tx frequency hopping

SRS for positioning Tx frequency hopping can be supported for UE in RRC\_CONNECTED and RRC\_INACTIVE. The UE can be configured with UTW during which the UE is allowed to transmit SRS for positioning Tx frequency hopping.

RRC configures the following parameters for the UTW for SRS for positioning Tx frequency hopping:

- *utw-SlotPeriodicity*: Periodicity of the UTW in slot;

- *utw-SlotOffset*: Offset of the beginning of the UTW with respect to the beginning of the UTW periodicityin time domain in slot;

- *uplinkTimeWindowTimer*: Time duration when the UE performs SRS transmission for positioning Tx frequency hopping.

When UTW is configured, the MAC entity shall start the *uplinkTimeWindowTimer* in the first symbol of the slot that the following condition is satisfied

CURRENT\_slot modulo (*utw-SlotPeriodicity*) = *utw-SlotOffset*

where CURRENT\_slot = [(SFN × *numberOfSlotsPerFrame*) + slot number in the frame] and *numberOfSlotsPerFrame* refers to the number of consecutive slots per frame as specified in TS 38.211 [8].

When UTW is configured and the UE is in RRC\_CONNECTED, the MAC entity shall instruct the lower layer to transmit SRS for positioning Tx frequency hopping when the *uplinkTimeWindowTimer* is running.

===================================NEXT CHANGE=====================================

6 Protocol Data Units, formats and parameters

6.1 Protocol Data Units

6.1.3 MAC Control Elements (CEs)

#### 6.1.3.xx SL-PRS Resource Request MAC CE

The SL-PRS Resource Request MAC CE is identified by a MAC subheader with eLCID as specified in Table 6.2.1-1b. It has the following fields:

- Destination index: The Destination Index field identifies the destination. The length of this field is 5 bits. The value is set to one index corresponding to SL destination identity associated to same destination reported in *[ffs\_RRCConfiguredList]* if present. The value is indexed sequentially from 0 in the same ascending order of SL destination identity in *[ffs\_RRCConfiguredList]*as specified in TS 38.331 [5]. When multiple lists are reported, the value is indexed sequentially across all the lists in the same order as presented in *SidelinkUEInformaitonNR* message;

- Priority: Priority of pending SL-PRS transmission. The length of this field is 3 bits.



Figure 6.1.3.xx-1: SL-PRS Resource Request MAC control element

===================================NEXT CHANGE=====================================

6.2 Formats and parameters

6.2.1 MAC subheader for DL-SCH and UL-SCH

The MAC subheader consists of the following fields:

- LCID: The Logical Channel ID field identifies the logical channel instance of the corresponding MAC SDU or the type of the corresponding MAC CE or padding as described in Tables 6.2.1-1, 6.2.1-1c and 6.2.1-2 for the DL-SCH and UL-SCH respectively. There is one LCID field per MAC subheader. The size of the LCID field is 6 bits. If the LCID field is set to 34, one additional octet is present in the MAC subheader containing the eLCID field and follow the octet containing LCID field. If the LCID field is set to 33, two additional octets are present in the MAC subheader containing the eLCID field and these two additional octets follow the octet containing LCID field;

NOTE 1: For MBS broadcast, a logical channel is identified based on G-RNTI and LCID if the same LCID is allocated for logical channels corresponding to different G-RNTIs.

- eLCID: The extended Logical Channel ID field identifies the logical channel instance of the corresponding MAC SDU or the type of the corresponding MAC CE as described in tables 6.2.1-1a, 6.2.1-1b, 6.2.1-2a and 6.2.1-2b for the DL-SCH and UL-SCH respectively. The size of the eLCID field is either 8 bits or 16 bits.

NOTE 2: The extended Logical Channel ID space using two-octet eLCID and the relevant MAC subheader format is used, only when configured, on the NR backhaul links between IAB nodes or between IAB node and IAB Donor, or for multicast MTCHs.

- L: The Length field indicates the length of the corresponding MAC SDU or variable-sized MAC CE in bytes. There is one L field per MAC subheader except for subheaders corresponding to fixed-sized MAC CEs, padding, and MAC SDUs containing UL CCCH. The size of the L field is indicated by the F field;

- F: The Format field indicates the size of the Length field. There is one F field per MAC subheader except for subheaders corresponding to fixed-sized MAC CEs, padding, and MAC SDUs containing UL CCCH. The size of the F field is 1 bit. The value 0 indicates 8 bits of the Length field. The value 1 indicates 16 bits of the Length field;

- R: Reserved bit, set to 0.

The MAC subheader is octet aligned.

**Table 6.2.1-1 Values of LCID for DL-SCH**

|  |  |
| --- | --- |
| **Codepoint/Index** | **LCID values** |
| 0 | CCCH |
| 1–32 | Identity of the logical channel of DCCH, DTCH and multicast MTCH |
| 33 | Extended logical channel ID field (two-octet eLCID field) |
| 34 | Extended logical channel ID field (one-octet eLCID field) |
| 35–46 | Reserved |
| 47 | Recommended bit rate |
| 48 | SP ZP CSI-RS Resource Set Activation/Deactivation |
| 49 | PUCCH spatial relation Activation/Deactivation |
| 50 | SP SRS Activation/Deactivation  |
| 51 | SP CSI reporting on PUCCH Activation/Deactivation |
| 52 | TCI State Indication for UE-specific PDCCH |
| 53 | TCI States Activation/Deactivation for UE-specific PDSCH |
| 54 | Aperiodic CSI Trigger State Subselection |
| 55 | SP CSI-RS/CSI-IM Resource Set Activation/Deactivation |
| 56 | Duplication Activation/Deactivation |
| 57 | SCell Activation/Deactivation (four octets) |
| 58 | SCell Activation/Deactivation (one octet) |
| 59 | Long DRX Command |
| 60 | DRX Command |
| 61 | Timing Advance Command |
| 62 | UE Contention Resolution Identity |
| 63 | Padding |

**Table 6.2.1-1a Values of two-octet eLCID for DL-SCH**

|  |  |  |
| --- | --- | --- |
| **Codepoint** | **Index** | **LCID values** |
| 0 to (216 – 1) | 320 to (216 + 319) | Identity of the logical channel |

**Table 6.2.1-1b Values of one-octet eLCID for DL-SCH**

|  |  |  |
| --- | --- | --- |
| **Codepoint** | **Index** | **LCID values** |
| 0 to 226 | 64 to 290 | Reserved |
| 227 | 291 | Serving Cell Set based SRS TCI State Indication MAC CE |
| 228 | 292 | SP/AP SRS TCI State Indication MAC CE |
| 229 | 293 | BFD-RS Indication MAC CE |
| 230 | 294 | Differential Koffset |
| 231 | 295 | Enhanced SCell Activation/Deactivation MAC CE with one octet Ci field |
| 232 | 296 | Enhanced SCell Activation/Deactivation MAC CE with four octet Ci field  |
| 233 | 297 | Unified TCI States Activation/Deactivation MAC CE |
| 234 | 298 | PUCCH Power Control Set Update for multiple TRP PUCCH repetition MAC CE |
| 235 | 299 | PUCCH spatial relation Activation/Deactivation for multiple TRP PUCCH repetition MAC CE |
| 236 | 300 | Enhanced TCI States Indication for UE-specific PDCCH |
| 237 | 301 | Positioning Measurement Gap Activation/Deactivation Command |
| 238 | 302 | PPW Activation/Deactivation Command |
| 239 | 303 | DL Tx Power Adjustment |
| 240 | 304 | Timing Case Indication |
| 241 | 305 | Child IAB-DU Restricted Beam Indication |
| 242 | 306 | Case-7 Timing advance offset |
| 243 | 307 | Provided Guard Symbols for Case-6 timing |
| 244 | 308 | Provided Guard Symbols for Case-7 timing |
| 245 | 309 | Serving Cell Set based SRS Spatial Relation Indication |
| 246 | 310 | PUSCH Pathloss Reference RS Update |
| 247 | 311 | SRS Pathloss Reference RS Update |
| 248 | 312 | Enhanced SP/AP SRS Spatial Relation Indication |
| 249 | 313 | Enhanced PUCCH Spatial Relation Activation/Deactivation |
| 250 | 314 | Enhanced TCI States Activation/Deactivation for UE-specific PDSCH |
| 251 | 315 | Duplication RLC Activation/Deactivation |
| 252 | 316 | Absolute Timing Advance Command |
| 253 | 317 | SP Positioning SRS Activation/Deactivation |
| 254 | 318 | Provided Guard Symbols |
| 255 | 319 | Timing Delta |

**Table 6.2.1-1c Values of LCID for MBS broadcast on DL-SCH**

|  |  |
| --- | --- |
| **Codepoint/Index** | **LCID values** |
| 0 | MCCH |
| 1–32 | Identity of the logical channel of broadcast MTCH |
| 33–63 | Reserved |

**Table 6.2.1-2 Values of LCID for UL-SCH**

|  |  |
| --- | --- |
| **Codepoint/Index** | **LCID values** |
| 0 | CCCH of size 64 bits (referred to as "CCCH1" in TS 38.331 [5]), except for a RedCap UE |
| 1–32 | Identity of the logical channel of DCCH and DTCH |
| 33 | Extended logical channel ID field (two-octet eLCID field) |
| 34 | Extended logical channel ID field (one-octet eLCID field) |
| 35 | CCCH of size 48 bits (referred to as "CCCH" in TS 38.331 [5]) for a RedCap UE  |
| 36 | CCCH of size 64 bits (referred to as "CCCH1" in TS 38.331 [5]) for a RedCap UE |
| 37–42 | Reserved |
| 43 | Truncated Enhanced BFR (one octet Ci) |
| 44 | Timing Advance Report |
| 45 | Truncated Sidelink BSR |
| 46 | Sidelink BSR |
| 47 | Reserved |
| 48 | LBT failure (four octets) |
| 49 | LBT failure (one octet) |
| 50 | BFR (one octet Ci) |
| 51 | Truncated BFR (one octet Ci) |
| 52 | CCCH of size 48 bits (referred to as "CCCH" in TS 38.331 [5]), except for a RedCap UE |
| 53 | Recommended bit rate query |
| 54 | Multiple Entry PHR (four octets Ci) |
| 55 | Configured Grant Confirmation |
| 56 | Multiple Entry PHR (one octet Ci) |
| 57 | Single Entry PHR |
| 58 | C-RNTI |
| 59 | Short Truncated BSR |
| 60 | Long Truncated BSR |
| 61 | Short BSR |
| 62 | Long BSR |
| 63 | Padding |

**Table 6.2.1-2a Values of two-octet eLCID for UL-SCH**

|  |  |  |
| --- | --- | --- |
| **Codepoint** | **Index** | **LCID values** |
| 0 to (216 – 1) | 320 to (216 + 319) | Identity of the logical channel |

**Table 6.2.1-2b Values of one-octet eLCID for UL-SCH**

|  |  |  |
| --- | --- | --- |
| **Codepoint** | **Index** | **LCID values** |
| 0 to 228 | 64 to 292 | Reserved |
| xx | yy | SL-PRS Resource Request |
| 229 | 293 | Enhanced Multiple Entry PHR for multiple TRP (four octets Ci) |
| 230 | 294 | Enhanced Multiple Entry PHR for multiple TRP (one octets Ci) |
| 231 | 295 | Enhanced Single Entry PHR for multiple TRP |
| 232 | 296 | Enhanced Multiple Entry PHR (four octets Ci) |
| 233 | 297 | Enhanced Multiple Entry PHR (one octets Ci) |
| 234 | 298 | Enhanced Single Entry PHR |
| 235 | 299 | Enhanced BFR (one octet Ci) |
| 236 | 300 | Enhanced BFR (four octet Ci) |
| 237 | 301 | Truncated Enhanced BFR (four octet Ci) |
| 238 | 302 | Positioning Measurement Gap Activation/Deactivation Request |
| 239 | 303 | IAB-MT Recommended Beam Indication |
| 240 | 304 | Desired IAB-MT PSD range |
| 241 | 305 | Desired DL Tx Power Adjustment |
| 242 | 306 | Case-6 Timing Request |
| 243 | 307 | Desired Guard Symbols for Case 6 timing |
| 244 | 308 | Desired Guard Symbols for Case 7 timing |
| 245 | 309 | Extended Short Truncated BSR |
| 246 | 310 | Extended Long Truncated BSR |
| 247 | 311 | Extended Short BSR |
| 248 | 312 | Extended Long BSR |
| 249 | 313 | Extended Pre-emptive BSR |
| 250 | 314 | BFR (four octets Ci) |
| 251 | 315 | Truncated BFR (four octets Ci) |
| 252 | 316 | Multiple Entry Configured Grant Confirmation |
| 253 | 317 | Sidelink Configured Grant Confirmation |
| 254 | 318 | Desired Guard Symbols |
| 255 | 319 | Pre-emptive BSR |

# 7 Variables and constants

## 7.1 RNTI values

RNTI values are presented in Table 7.1-1.

Table 7.1-1: RNTI values.

|  |  |
| --- | --- |
| Value (hexa-decimal) | RNTI |
| 0000 | N/A |
| 0001–FFF2 | RA-RNTI, MSGB-RNTI, Temporary C-RNTI, C-RNTI, CI-RNTI, MCS-C-RNTI, CS-RNTI, TPC-PUCCH-RNTI, TPC-PUSCH-RNTI, TPC-SRS-RNTI, INT-RNTI, SFI-RNTI, SP-CSI-RNTI, PS-RNTI, SL-RNTI, SL-CS-RNTI, SL-PRS-RNTI, SL-PRS-CS-RNTI, SL Semi-Persistent Scheduling V-RNTI, AI-RNTI, G-RNTI, G-CS-RNTI, and CG-SDT-CS-RNTI |
| FFF3–FFFB | Reserved |
| FFFC | PEI-RNTI |
| FFFD | MCCH-RNTI |
| FFFE | P-RNTI |
| FFFF | SI-RNTI |

Table 7.1-2: RNTI usage.

|  |  |  |  |
| --- | --- | --- | --- |
| RNTI | Usage | Transport Channel | Logical Channel |
| P-RNTI | Paging and System Information change notification | PCH | PCCH |
| SI-RNTI | Broadcast of System Information | DL-SCH | BCCH |
| RA-RNTI | Random Access Response | DL-SCH | N/A |
| MSGB-RNTI | Random Access Response for 2-step RA type | DL-SCH | CCCH, DCCH, DTCH |
| Temporary C-RNTI | Contention Resolution(when no valid C-RNTI is available) | DL-SCH | CCCH, DCCH, DTCH |
| Temporary C-RNTI | Msg3 transmission | UL-SCH | CCCH, DCCH, DTCH |
| C-RNTI, MCS-C-RNTI | Dynamically scheduled unicast transmission | UL-SCH | DCCH, DTCH |
| C-RNTI | Dynamically scheduled unicast transmission | DL-SCH | CCCH, DCCH, DTCH |
| MCS-C-RNTI | Dynamically scheduled unicast transmission | DL-SCH | DCCH, DTCH |
| C-RNTI | Triggering of PDCCH ordered random access | N/A | N/A |
| C-RNTI | Dynamically scheduled PTP retransmission for initial PTM transmission for multicast MBS. | DL-SCH | MTCH |
| CG-SDT-CS-RNTI | Dynamically scheduled unicast transmission(retransmission) | UL-SCH | CCCH, DCCH, DTCH |
| CS-RNTI | Configured scheduled unicast transmission(activation, reactivation and retransmission) | DL-SCH, UL-SCH | DCCH, DTCH |
| CS-RNTI | Configured scheduled unicast transmission(deactivation) | N/A | N/A |
| CS-RNTI | Configured scheduled unicast transmission(PTP retransmission for initial PTM transmission) | DL-SCH | MTCH |
| CS-RNTI | Configured scheduled unicast transmission(MBS SPS deactivation) | N/A | N/A |
| G-CS-RNTI | Configured scheduled multicast transmission(activation, reactivation and retransmission) | DL-SCH | MTCH |
| G-CS-RNTI | Configured scheduled multicast transmission (deactivation) | N/A | N/A |
| TPC-PUCCH-RNTI | PUCCH power control | N/A | N/A |
| TPC-PUSCH-RNTI | PUSCH power control | N/A | N/A |
| TPC-SRS-RNTI | SRS trigger and power control | N/A | N/A |
| INT-RNTI | Indication pre-emption in DL | N/A | N/A |
| SFI-RNTI | Slot Format Indication on the given cell | N/A | N/A |
| SP-CSI-RNTI | Activation of Semi-persistent CSI reporting on PUSCH | N/A | N/A |
| CI-RNTI | Cancellation indication in UL | N/A | N/A |
| PS-RNTI | DCP to indicate whether to start *drx-onDurationTimer* for associated DRX cycle | N/A | N/A |
| SL-RNTI | Dynamically scheduled sidelink transmission | SL-SCH | SCCH, STCH |
| SL-CS-RNTI | Configured scheduled sidelink transmission(activation, reactivation and retransmission) | SL-SCH | SCCH, STCH |
| SL-CS-RNTI | Configured scheduled sidelink transmission(deactivation) | N/A | N/A |
| SL-PRS-RNTI | Dynamically scheduled sidelink PRS transmission | N/A | N/A |
| SL-PRS-CS-RNTI | Configured scheduled sidelink PRS transmission (activation and reactivation) | N/A | N/A |
| SL-PRS-CS-RNTI | Configured scheduled sidelink PRS transmission (deactivation) | N/A | N/A |
| SL Semi-Persistent Scheduling V-RNTI (NOTE 2) | Semi-Persistently scheduled sidelink transmission for V2X sidelink communication(activation, reactivation and retransmission) | SL-SCH | STCH |
| SL Semi-Persistent Scheduling V-RNTI(NOTE 2) | Semi-Persistently scheduled sidelink transmission for V2X sidelink communication(deactivation) | N/A | N/A |
| AI-RNTI | Availability indication on the given cell | N/A | N/A |
| G-RNTI | Dynamically scheduled MBS PTM transmission | DL-SCH | MTCH |
| MCCH-RNTI | Dynamically scheduled MCCH signalling and MCCH change notification | DL-SCH | MCCH |
| PEI-RNTI | Paging Early Indication | N/A | N/A |
| NOTE 1: The usage of MCS-C-RNTI is equivalent to that of C-RNTI in MAC procedures (except for the C-RNTI MAC CE).NOTE 2: The MAC entity uses SL Semi-Persistent Scheduling V-RNTI to control semi-persistently scheduled sidelink transmission on SL-SCH for V2X sidelink communication as specified in clause 5.14.1.1 of TS 36.321 [22].NOTE 3: The usage of CG-SDT-CS-RNTI is equivalent to that of CS-RNTI when there is an CG-SDT procedure ongoing. |

===================================CHANGE ENDS======================================