**3GPP TSG RAN WG1 Meeting #114 R1-230xxxx**

**Toulouse, France, August 21 – 25, 2023**

**Agenda item: 9.17**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Summary on email discussion on Sidelink enhancements**

**Document for: Discussion and Decision**

# 1 Introduction

This thread will discuss the draft CR to 38.214 for the Sidelink enhancements.

First checkpoint for this discussion: **September 5, 6:00 UTC**!

# 2 Discussion – first round

The comments in this section are based on version 0 of the the draft CR available in the **Post RAN1#114 discussion.**

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| --- | --- | --- |
| Company | Comments | Editor reply/Notes |
| LGE | On Section 8.1.2.1, there is some typo.  For operation with shared spectrum channel access in frequency range 1, for the first ~~U~~SL transmission to initiate a channel occupancy  Moreover, according to the following WA, the above scheme is applied for the case when UE performs Type 2A to transmit PSCCH/PSSCH within the shared COT as well.  Working assumption  When UE performs Type 2 channel access to transmit PSCCH/PSSCH within a COT:   * By default, only one value is (pre-)configured for the set of CPE starting position for inside COT   + The value is the default CPE starting position   + UE only use the (pre-)configured default CPE starting position * When more than one values are (pre-)configured for the set of CPE starting position for inside COT   + One of these values is the default CPE starting position   + UE use the same method for using CPE for the case when UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission * FFS: whether to support that CPE can be transmitted between any two consecutive SL transmissions between COT initiator and responder, to reduce the gap between two transmissions so that it does not exceed 16us, the CPE is selected from the CPE(s) (pre-)configured for PSCCH/PSSCH within a COT   In addition, Scheme 1 also needs to be captured as well as Scheme 2 in this part.  **Agreement**  When UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission:   * Scheme 1: The UE selects the (pre-)configured default CPE starting position. * Scheme 2: A CPE starting position is randomly selected among one or multiple CPE starting candidate positions (pre-)configured per priority of the PSCCH/PSSCH transmission   + The mapping one or multiple CPE starting positions per priority can be up to (pre-)configuration.   + FFS: whether the priority should be the L1 priority or CAPC (to be down-selected in RAN1#114) * For partial and full RB set resource allocations   + If a resource reservation is transmitted or resource reservations is detected for the slot and the RB set(s) of the intended PSCCH/PSSCH transmission, Scheme 1 is applied; otherwise, Scheme 2 is applied   + FFS: other conditions to determine whether to use scheme 1 or scheme 2   + FFS: further enhancements for the full RB set case   In those points of views, we suggest following text:  For operation with shared spectrum channel access in frequency range 1, for the first SL transmission to initiate a channel occupancy or within a shared channel occupancy the UE determines a duration of a cyclic prefix extension *Text* to be applied according to [4, TS 38.211] where the index for [4, TS 38.211] is chosen to be default value provided by the higher layer parameter *CPEStartingPositionsPSCCH-PSSCH-InitiateCOT* if the resource for the SL transmission is indicated by a SCI format 1-A of the UE or if the SL transmission is in a slot where it is assumed that SL transmission of another UE occurs or be chosen randomly from a set of values for the priority of the SL transmission configured by the higher layer parameter *CPEStartingPositionsPSCCH-PSSCH-InitiateCOT, otherwise*.  On the section 8.1.4, it would be necessary to consider RB set concepts as well including the number of consecutive RB sets and the update on the definition of candidate resource. MCSt also needs to be captured.  Working assumption  In Mode 2 resource allocation:   * Alt. 1: (rectangular shaped)   + For contiguous RB based     - A candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot .   + For interlaced RB based     - A candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot in contiguous RB sets starting from RB set z.     - A candidate single-slot resource is defined as a set of contiguous sub-channels starting from sub-channel in slot in contiguous RB sets starting from RB set z. * Note, different candidate multi-slot resources can overlap in time.   Agreement  In Mode 2 resource allocation,   * The higher layer can indicate a “number of consecutive slots for MCSt” () larger than 1 for L1 reporting multi-slots candidates to the higher layer. The candidate multi-slots resource definition is applied.   + Otherwise, the candidate single-slot resource definition is applied (same as R16/17). * The higher layer selects resources from the reported according to one of the following based on UE implementation:   + Random selection as per R16/17   + Higher layer is not restricted to select resources at random, and can select in consecutive slots     - It is up to RAN2 to define detailed behaviour as needed   + It is RAN1 intention that, once the higher layer selects a multi-slots candidate from the set , it will use all the single-slot resources of the selected multi-slots candidate for transmission. This RAN1 agreement has no intention on potential RAN2 discussion about how SL resource selection processes are defined in MCSt. * Note, the above is intended to support Approach 1 and 2 only. * Send an LS to RAN2 informing that it is up to RAN2 to decide in regards to the HARQ RTT timing (minimum time gap)   + whether a single TB transmitted over consecutive slots is supported in a resource pool configured with PSFCH resource   So, we suggest to add following text.  In the parameters provided by higher layer  - Optionally, a number of consecutive slots for multi-consecutive slot transmission,  In step 1:  If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, A candidate single-slot resource for transmission is defined as a set of contiguous sub-channels with sub-channel *x+j* within a set of contiguous RB sets with RB set *z+k* in slot where and .  If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘contiguousRB’ and if is provided, A candidate multi-slot resource for transmission is defined as a set of contiguous sub-channels with sub-channel *x+j* within a set of contiguous RB sets in consecutive slots starting from slot where .  If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’ and if is provided, A candidate multi-slot resource for transmission is defined as a set of contiguous sub-channels with sub-channel *x+j* within a set of contiguous RB sets with RB set *z+k* in consecutive slots starting from slot where and .  For the remaining parts, it can be considered to replace “candidate single slot resource R\_x,y” with “candidate resource R\_x,y or R\_x,y,z”.  On Section 8.1.2.2, the lowest sub-channel needs to be clarified as per the following agreement. According to NR-U interlace definition, it is possible that the subchannel with lowest index does not occupy the actual lowest frequency region.  **Agreement**  For interlace RB-based PSCCH/PSSCH transmission in SL-U, support the following:   * Option 1: lowest sub-channel is the sub-channel with smallest sub-channel index   The lowest sub-channel index for sidelink transmission is the sub-channel on which the lowest PRB of the associated PSCCH is transmitted.  On section 8, the definition of subchannel for interlaced RB-based transmission would need to be more clarified as per the following agreement.  **Agreement**  For interlace RB-based PSCCH/PSSCH transmission in SL-U:   * Regarding mapping between sub-channel and interlace, 1 sub-channel is defined and indexed within 1 RB set, and is periodically indexed across different RB sets within the resource pool * If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, in the frequency domain, a sidelink resource pool consists of sl-NumSubchannel sub-channels, where each sub-channel ~~is given by the higher layer parameter~~ consists of *numInterlacePerSubchannel* contiguous interlace indices ~~interlaces~~. |  |
| CATT/GH | Thanks the editor for the great efforts on drafting the CR! Please find our comments below.   * **Comment 1 (**Clause 8.1):   + “COT sharing cast type” is missed as one of the fields in SCI format 2-A.  |  | | --- | | - the UE shall set value of the ‘*CAPC*’ field as indicated by higher layers.  - the UE shall set value of the ‘*COT sharing cast type*’ field as indicated by higher layers.  - the UE shall set value of the ‘*Additional ID’* field as indicated by higher layers.  - the UE shall set value of the ‘*Remaining COT duration’* field as indicated by higher layers. |  * **Comment 2 (**Clause 8.1):   + In order to align with TS 38.212, the newly added fields in SCI format 2-B and SCI format 2-C should be deleted. * **Comment 3 (**Clause 8.1.2.1):   + CPE determination agreements for PSCCH/PSSCH transmission should be captured.  |  | | --- | | **Agreement**  When UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission:   * Scheme 1: The UE selects the (pre-)configured default CPE starting position. * Scheme 2: A CPE starting position is randomly selected among one or multiple CPE starting candidate positions (pre-)configured per priority of the PSCCH/PSSCH transmission   + The mapping one or multiple CPE starting positions per priority can be up to (pre-)configuration.   + FFS: whether the priority should be the L1 priority or CAPC (to be down-selected in RAN1#114) * For partial and full RB set resource allocations   + If a resource reservation is transmitted or resource reservations is detected for the slot and the RB set(s) of the intended PSCCH/PSSCH transmission, Scheme 1 is applied; otherwise, Scheme 2 is applied   + FFS: other conditions to determine whether to use scheme 1 or scheme 2   + FFS: further enhancements for the full RB set case   Working assumption  When UE performs Type 2 channel access to transmit PSCCH/PSSCH within a COT:   * By default, only one value is (pre-)configured for the set of CPE starting position for inside COT   + The value is the default CPE starting position   + UE only use the (pre-)configured default CPE starting position * When more than one values are (pre-)configured for the set of CPE starting position for inside COT   + One of these values is the default CPE starting position   + UE use the same method for using CPE for the case when UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission * FFS: whether to support that CPE can be transmitted between any two consecutive SL transmissions between COT initiator and responder, to reduce the gap between two transmissions so that it does not exceed 16us, the CPE is selected from the CPE(s) (pre-)configured for PSCCH/PSSCH within a COT |  * **Comment 4 (**Clause 8.1.2.1):   + Regarding the candidate starting symbol(s), the case that only one candidate starting symbol is supported for slot with PSFCH symbols, as following agreement, is not captured.   **Agreement**  Slots with PSFCH symbols only have 1 candidate starting symbol for PSCCH/PSSCH.   * **Comment 5 (**Clause 8.1.4):   + The legacy description on *LsubCH* can be removed.  |  | | --- | | - the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot, ; |  * **Comment 6 (**Clause 8.1.4):   + The wording should be aligned with RAN2, where “consecutive LBT failure” should be changed to “consistent LBT failure” * **Comment 7 (**Clause 8.1.4):   + The following highlight part is redundant and may cause some ambiguity, which can be removed.  |  | | --- | | If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘contiguousRB', the UE shall exclude candidate single-slot resource, whose lowest sub-channel of a RB set includes resource blocks of the intra-cell guardband PRBs, configured by higher layer parameter, *intraCellGuardBandsSL-List*. |   Agreement  Regarding “*For contiguous RB-based PSCCH/PSSCH transmission in SL-U, regarding sub-channel(s) which include intra-cell guardband PRBs, support only option 3*” and “*Option 3: Such sub-channel(s) cannot be used for PSCCH transmission, and can be used for PSSCH transmission*”:   * Candidate resource, whose lowest sub-channel includes intra-cell guardband PRBs, is excluded   + Such exclusion is performed in PHY layer, and such candidate resource is excluded in Step 1 * **Comment 8 (**Clause 8.1.4):   + The detail designs on enhancements for resource selection procedure considering C-LBT need further discussion, such as which step is applied, the following parts should be removed.  |  | | --- | | If *rbSetsWithConsecutiveLBTFailure* is provided, the UE shall exclude candidate single-slot resources, whose associated RB sets is included in the *rbSetsWithConsecutiveLBTFailure* parameter. |  * **Comment 9 (**Clause 8.1.4):   + the following agreements regarding candidate multi-slots resources should **also** be captured in clause 8.1.4.  |  | | --- | | Working assumption  In Mode 2 resource allocation:   * Alt. 1: (rectangular shaped)   + For contiguous RB based     - A candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot .   + For interlaced RB based     - A candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot in contiguous RB sets starting from RB set z.     - A candidate single-slot resource is defined as a set of contiguous sub-channels starting from sub-channel in slot in contiguous RB sets starting from RB set z. * Note, different candidate multi-slot resources can overlap in time.   Agreement  In Mode 2 resource allocation,   * The higher layer can indicate a “number of consecutive slots for MCSt” () larger than 1 for L1 reporting multi-slots candidates to the higher layer. The candidate multi-slots resource definition is applied.   + Otherwise, the candidate single-slot resource definition is applied (same as R16/17). * The higher layer selects resources from the reported according to one of the following based on UE implementation:   + Random selection as per R16/17   + Higher layer is not restricted to select resources at random, and can select in consecutive slots     - It is up to RAN2 to define detailed behaviour as needed   + It is RAN1 intention that, once the higher layer selects a multi-slots candidate from the set , it will use all the single-slot resources of the selected multi-slots candidate for transmission. This RAN1 agreement has no intention on potential RAN2 discussion about how SL resource selection processes are defined in MCSt. * Note, the above is intended to support Approach 1 and 2 only. * Send an LS to RAN2 informing that it is up to RAN2 to decide in regards to the HARQ RTT timing (minimum time gap)   + whether a single TB transmitted over consecutive slots is supported in a resource pool configured with PSFCH resource | |  |
| vivo | 1. For CPE determination for PSCCH/PSSCH COT initiating in section 8.1.2.1, the default CPE part is not captured, and how to select CPE based on resource reservation is not captured neither.   114 Working assumption  When UE performs Type 2 channel access to transmit PSCCH/PSSCH within a COT:   * By default, only one value is (pre-)configured for the set of CPE starting position for inside COT   + The value is the default CPE starting position   + UE only use the (pre-)configured default CPE starting position * When more than one values are (pre-)configured for the set of CPE starting position for inside COT   + One of these values is the default CPE starting position   + UE use the same method for using CPE for the case when UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission   FFS: whether to support that CPE can be transmitted between any two consecutive SL transmissions between COT initiator and responder, to reduce the gap between two transmissions so that it does not exceed 16us, the CPE is selected from the CPE(s) (pre-)configured for PSCCH/PSSCH within a COT   1. Some modification for the current CPE part based on above agreement.   For operation with shared spectrum channel access in frequency range 1, for the first ~~UL transmission~~ SL PSCCH/PSSCH transmission by the COT initiating UE in ~~the to initiate~~ a channel occupancy the UE determines a duration of a cyclic prefix extension *Text* to be applied according to [4, TS 38.211] where the index for [4, TS 38.211] is chosen randomly from a set of values configured by the higher layer parameter *CPEStartingPositionsPSCCH-PSSCH-InitiateCOT according to the priority of the* PSCCH/PSSCH transmission.   1. For In-COT case, i.e., COT sharing or SL burst, the CPE determination rule should be captured in 8.1.2.1 as well   **113 Agreement**  Specification supports that CPE can be transmitted between any two consecutive SL transmissions by the same UE to reduce the gap between the two transmissions so that it does not exceed 16µs.  114 Working assumption  When UE performs Type 2 channel access to transmit PSCCH/PSSCH within a COT:   * By default, only one value is (pre-)configured for the set of CPE starting position for inside COT   + The value is the default CPE starting position   + UE only use the (pre-)configured default CPE starting position * When more than one values are (pre-)configured for the set of CPE starting position for inside COT   + One of these values is the default CPE starting position   + UE use the same method for using CPE for the case when UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission   FFS: whether to support that CPE can be transmitted between any two consecutive SL transmissions between COT initiator and responder, to reduce the gap between two transmissions so that it does not exceed 16us, the CPE is selected from the CPE(s) (pre-)configured for PSCCH/PSSCH within a COT |  |
| ZTE,Sanechips | （1）As sl-NumSubchannel is number of subchannels within a RB set as defined in 8.1.5, and only subchannel with continuous interlace is agreed, in order to avoid any misunderstanding, a corresponding modification is needed for beginning part of chapter 8 :   * If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, in the frequency domain, a sidelink resource pool consists of contiguous sl-NumRBset RB sets and sl-NumSubchannel sub-channels in each RB set, where each sub-channel is given by the higher layer parameter *numInterlacePerSubchannel* contiguous interlaces.   Another paragraph in chapter 8  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, the sub-channel *m* for consists of a set of *numInterlacePerSubchannel* continuous interlaces, where each interlace consists of at least 10 resource blocks as defined in clause 4.4.4.6 of [4, TS 38.211]. The lowest RB in the resource pool is given by the higher layer parameter *startRBResourcePool*. The sub-channel *m* is indexed per RB set and is periodically indexed across multiple RB sets within the resource pool. The sub-channel with the same index is mapped to the set of *numInterlacePerSubchannel* contiguous interlace(s) with the same index(s) in different RB sets. Sub-channel#m is mapped toK contiguous interlace(s) starting from interlace#m\*K . is the number of subchannels in each RB set of the resource pool given by the higher layer parameter sl-NumSubchannel.   1. In 8.1.2.1, as two schemes are agreed for the CPE determination for Type 1 channel access to initiate a COT, but it seems that only scheme 2 is captured, so it is suggested that:   - For operation with shared spectrum channel access in frequency range 1, for the first UL transmission to initiate a channel occupancy the UE determines a duration of a cyclic prefix extension *Text* to be applied according to [4, TS 38.211] where the index for [4, TS 38.211] is chosen randomly from a set of values configured by the higher layer parameter *CPEStartingPositionsPSCCH-PSSCH-InitiateCOT* if neither a resource reservation is transmitted nor resource reservations is detected for the slot and the RB set(s) of the intended PSCCH/PSSCH transmission*,*otherwise the (pre-)configured default CPE starting position is applied.  3 ) Regarding set of subframes part for co-channel coexistence, because it was specified as “The set of subframes that may belong to a PSSCH resource pool for sidelink transmission mode 3 or 4 is denoted by in 36.213”. Therefore, the modification suggestions are as follows in blue font.  “For dynamic co-channel coexistence of LTE sidelink and NR sidelink, denotes the set of subframes that may belong to an LTE sidelink resource pool as defined in clause 14.1.5 of [19, TS36.213].”   1. Regarding 2LTE) part for co-channel coexistence, it does not refer to the LTE sensing window, but the shared information window used by NR SL module. In addition, n should be the time where NR SL module triggers its NR SL resource (re)selection procedure. Therefore, the modification suggestions are as follows in blue font.   “2LTE) In case of dynamic co-channel coexistence of LTE sidelink and NR sidelink: The information sharing window that NR will use from within UE is defined by the range of LTE subframes [], where is the NR slot where NR SL module triggers its NR SL resource (re)selection procedure, is 1100 msec and is up to UE implementation under ; is 4+T msec, where T ≤ 4 msec. The UE shall perform the procedures in 5LTE3 and 6LTE based on PSCCH decoded and RSRP measured in these LTE subframes.” |  |
| **Huawei, HiSilicon** | Thanks for great efforts the draft, pleas find our **Comments for SL-U Channel Access.**  **Comment #1: CPE starting position**  **Reason for change:**   * **Change #1:** One typo, it should be “first SL transmission to initiate a channel occupancy” rather than “first UL transmission to initiate a channel occupancy”. * **Change #2:** Based on the agreement below, the detail of how to use CPE for transmission initiating a COT has not been captured clearly, and we suggest the wording as below.  |  | | --- | | **Agreement**  When UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission:   * Scheme 1: The UE selects the (pre-)configured default CPE starting position. * Scheme 2: A CPE starting position is randomly selected among one or multiple CPE starting candidate positions (pre-)configured per priority of the PSCCH/PSSCH transmission   + The mapping one or multiple CPE starting positions per priority can be up to (pre-)configuration.   + FFS: whether the priority should be the L1 priority or CAPC (to be down-selected in RAN1#114) * For partial and full RB set resource allocations   + If a resource reservation is transmitted or resource reservations is detected for the slot and the RB set(s) of the intended PSCCH/PSSCH transmission, Scheme 1 is applied; otherwise, Scheme 2 is applied   + FFS: other conditions to determine whether to use scheme 1 or scheme 2   + FFS: further enhancements for the full RB set case |   **Suggested Changes:**   |  | | --- | | **#TS 38.214 Clause 8.1.4#**  <omitted text>   * For operation with shared spectrum channel access in frequency range 1, for the first ~~UL~~SL transmission to initiate a channel occupancy , and if no a resource reservation is transmitted or resource reservations is detected for the slot and the RB set(s) of the intended PSCCH/PSSCH transmission, the UE determines a duration of a cyclic prefix extension *Text* to be applied according to [4, TS 38.211] where the index for [4, TS 38.211] is chosen randomly from a set of value(s) configured per priority of the PSCCH/PSSCH by the higher layer parameter *CPEStartingPositionsPSCCH-PSSCH-InitiateCOT*. Otherwise, use a configured default cyclic prefix extension *Text* indicated by *DefaultCPEStartingPositionsPSCCH-PSSCH-InitiateCOT.*   <omitted text> |  * **Change #3**: The agreement for CPE determination inside a COT as following is not captured. We kindly ask editor to capture the agreement in the next version and an example is suggested as below as well.  |  | | --- | | **Working assumption**  When UE performs Type 2 channel access to transmit PSCCH/PSSCH within a COT:   * By default, only one value is (pre-)configured for the set of CPE starting position for inside COT   + The value is the default CPE starting position   + UE only use the (pre-)configured default CPE starting position * When more than one values are (pre-)configured for the set of CPE starting position for inside COT   + One of these values is the default CPE starting position   + UE use the same method for using CPE for the case when UE performs Type 1 channel access to initiate a COT for PSCCH/PSSCH transmission * FFS: whether to support that CPE can be transmitted between any two consecutive SL transmissions between COT initiator and responder, to reduce the gap between two transmissions so that it does not exceed 16us, the CPE is selected from the CPE(s) (pre-)configured for PSCCH/PSSCH within a COT |   **Example for capturing the agreement:**   |  | | --- | | **8.1.2.1 Resource allocation in time domain**  ...  - For operation with shared spectrum channel access in frequency range 1, for the SL transmission in a shared channel occupancy initiated by another UE*,* the shared UE determines a duration of a cyclic prefix extension *Text* according to indicated by higher layer parameter *DefaultCPEStartingPositionsPSCCH-PSSCH-SharedCOT* by default.When multiple CPE starting positions for sharing a COT is provided by *CPEStartingPositionsPSCCH-PSSCH-SharedCOT,* shared UE determines a duration of a cyclic prefix using the same method for the case the UE initiates a channel occupancy. |   **Comment #2 for MCSt**  **Reason for change:**  The following agreements on MCSt are not captured in Mode 2 resource allocation, we kindly ask editor could reflect it in the next update. An example is also provided as reference, detailed description is up to editor.   |  | | --- | | Working assumption  In Mode 2 resource allocation:   * Alt. 1: (rectangular shaped)   + For contiguous RB based     - A candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot .   + For interlaced RB based     - A candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot in contiguous RB sets starting from RB set z.     - A candidate single-slot resource is defined as a set of contiguous sub-channels starting from sub-channel in slot in contiguous RB sets starting from RB set z. * Note, different candidate multi-slot resources can overlap in time.   Agreement  In Mode 2 resource allocation,   * The higher layer can indicate a “number of consecutive slots for MCSt” () larger than 1 for L1 reporting multi-slots candidates to the higher layer. The candidate multi-slots resource definition is applied.   + Otherwise, the candidate single-slot resource definition is applied (same as R16/17). * The higher layer selects resources from the reported according to one of the following based on UE implementation:   + Random selection as per R16/17   + Higher layer is not restricted to select resources at random, and can select in consecutive slots     - It is up to RAN2 to define detailed behaviour as needed   + It is RAN1 intention that, once the higher layer selects a multi-slots candidate from the set , it will use all the single-slot resources of the selected multi-slots candidate for transmission. This RAN1 agreement has no intention on potential RAN2 discussion about how SL resource selection processes are defined in MCSt. * Note, the above is intended to support Approach 1 and 2 only. * Send an LS to RAN2 informing that it is up to RAN2 to decide in regards to the HARQ RTT timing (minimum time gap)   + whether a single TB transmitted over consecutive slots is supported in a resource pool configured with PSFCH resource |   **Example for capturing the agreements:**   |  | | --- | | **#TS 38.214 Clause 8.1.4#**  <omitted text>  - the resource pool from which the resources are to be reported;  - L1 priority, ;  - the remaining packet delay budget;  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is not provided, the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot is . If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘contiguousRB', corresponds to the number of sub-channels within all used RB sets to be used for the PSCCH/PSSCH transmission in a slot. If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, corresponds to the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot in each RB set,  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, the number of used RB sets for one PSCCH/PSSCH transmission, LRBset.  - the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot, ;  - optionally, number of consecutive slots for Multi-consecutive slots transmission, .  - optionally, the resource reservation interval, , in units of msec.  <omitted text>  The following steps are used:  1) If a number of consecutive slots is provided with value larger than 1, the candidate multi-slots resource definition is applied. Otherwise, the candidate single-slot resource definition is applied. If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘contiguousRB', a candidate multi-slots resource is defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot . If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, a candidate multi-slots resourceis defined as a set of contiguous sub-channels starting from sub-channel in consecutive slots starting from slot in contiguous RB sets starting from RB set z. A candidate single-slot resource for transmission is defined as a set of contiguous sub-channels with sub-channel *x+j* in slot where . The UE shall assume that any set of contiguous sub-channels or contiguous sub-channels in contiguous RB sets included in the corresponding resource pool within the time interval correspond to one candidate single-slot resource or one candidate multi-slots resource for UE performing full sensing, in a set of *Y* candidate slots within the time interval correspond to one candidate single-slot resource for UE performing periodic-based partial sensing together with contiguous partial sensing and resource (re)selection triggered by periodic transmission (), or in a set of *Y'* candidate slots within the time interval correspond to one candidate single-slot resource for UE performing at least contiguous partial sensing and resource (re)selection triggered by aperiodic transmission (), where  <omitted text>  The total number of candidate single-slot resources or candidate multi-slots resources is denoted by .  <omitted text>  4) The set is initialized to the set of all the candidate single-slot resources or candidate multi-slots resources.  5) The UE shall exclude any candidate single-slot resource */* or candidate multi-slots resource */* from the set if it meets all the following conditions:  - the UE has not monitored slot in Step 2.  - for any periodicity value allowed by the higher layer parameter *sl-ResourceReservePeriodList* and a hypothetical SCI format 1-A received in slot with '*Resource reservation period*' field set to that periodicity value and indicating all subchannels of the resource pool in this slot, condition c in step 6 would be met.  5a) If the number of candidate single-slot resources */* or candidate multi-slots resources */* remaining in the set is smaller than , the set is initialized to the set of all the candidate single-slot resources or candidate multi-slots resources as in step 4.  6) The UE shall exclude any candidate single-slot resource */* or candidate multi-slots resource */* from the set if it meets all the following conditions:  <omitted text>  7) If the number of candidate single-slot resources or candidate multi-slots resources remaining in the set is smaller than , then [ and , if set, ] is increased by 3 dB for each priority value and the procedure continues with step 4. | |  |
| Huawei, HiSilicon\_2 | **Comments for SL-U PHY channel design**  Comment 1:  Suggest following red changes, details are:   * Need to reflect “contiguous interlace” as per agreement. * It seems the mapping details in agreement (copied below) is not captured yet.   + *“Option 2: sub-channel#0 is mapped to K interlace(s) starting from interlace#0”*   + *“sub-channel#1 is mapped to K interlace(s) starting from interlace#K, and so on”* * Add “…and the UE uses both of these two RB sets for PSSCH transmission” to align with agreement and be accurate.   ==  In the frequency domain,  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is not provided, or it is set to ‘contiguousRB', a sidelink resource pool consists of *sl-NumSubchannel* contiguous sub-channels. A sub-channel consists of *sl-SubchannelSize* contiguous PRBs, where *sl-NumSubchannel* and *sl-SubchannelSize* are higher layer parameters.   * If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, in the frequency domain, a sidelink resource pool consists of sl-NumSubchannel sub-channels, where each sub-channel consists of *numInterlacePerSubchannel* contiguous interlace(s) and *numInterlacePerSubchannel* is ~~given by the~~ higher layer parameter ~~numInterlacePerSubchannel interlaces~~.   For operation with shared spectrum channel access for frequency range 1, a sidelink resource pool can be (pre-)configured to include integer number of RB sets. A UE can be configured with intra-cell guard bands according to the higher layer parameter *intraCellGuardBandsSL-List*. The configured intra-cell guard band PRBs between any two adjacent RB sets can be used only for PSSCH transmission, if and only if, , a UE has successfully performed channel access procedure in both adjacent RB sets and the UE uses both of these two RB sets for PSSCH transmission.  **Agreement**  For interlace RB-based PSCCH/PSSCH transmission in SL-U, regarding details of mapping between sub-channel and interlace:   * In a resource pool with multiple RB sets, sub-channel with the same index is mapped to K interlace(s) with the same index(s) in different RB sets. * In a resource pool, support the following   + At least for the agreed case where one SL resource pool can be (pre-)configured to include integer number of RB sets     - Option 2: sub-channel#0 is mapped toK interlace(s) starting from interlace#0       * sub-channel#1 is mapped toK interlace(s) starting from interlace#K, and so on       * At least support that the above K interlace(s) are contiguous         + FFS: whether/how to support the above K interlace(s) are non-contiguous   + FFS: if RAN1 agrees to support that one SL resource pool can be (pre-)configured to include sub-set of PRBs of one RB set, the mapping between sub-channel and interlace for this case will be further discussed * Interlace is indexed as per NR-U   **Agreement**  Regarding usage of PRBs within intra-cell guard band of two adjacent RB sets:   * Such PRBs can be used for PSSCH transmission if and only if a UE can transmit on the respective LBT channels after performing channel access procedure in multi-channel case and the UE uses both of these two RB sets for PSSCH transmission   + FFS details, e.g., handling of potential unequal sub-channel size, for interlaced RB based transmission, whether the PRB(s) in the intra-cell guard band have the same interlace index(s) as the PRBs for PSSCH transmission in these two RB sets * Such PRBs are not used for PSCCH transmission   + FFS: whether or not such PRBs are used for PSFCH/S-SSB transmission   Comment 2:  Suggest following red changes, details are:   * Need to reflect “contiguous interlace” as per agreement.   ==  The UE determines the set of resource blocks assigned to a sidelink resource pool as follows:  - The resource block pool consists of PRBs.  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is not provided, or is set to ‘contiguousRB', the sub-channel *m* for consists of a set of contiguous resource blocks with the physical resource block number for , where , and *numSubchannel* are given by higher layer parameters *sl-StartRB-Subchannel*, *sl-SubchannelSize* and *sl-NumSubchannel*, respectively.  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, the sub-channel *m* for consists of a set of *numInterlacePerSubchannel* contiguous interlaces, where each interlace consists of at least 10 resource blocks as defined in clause 4.4.4.6 of [4, TS 38.211]. The lowest RB in the resource pool is given by the higher layer parameter *startRBResourcePool*. The sub-channel *m* is indexed per RB set and is periodically indexed across multiple RB sets within the resource pool. The sub-channel with the same index is mapped to the set of *numInterlacePerSubchannel* interlace(s) with the same index(s) in different RB sets.  Comment 3:  Suggest following red changes, details are:   * So far, these new fields are only in SCI 2-A, need to remove those in SCI 2-B, 2-C   ==  The UE shall set the contents of the SCI formats 2-B as follows:  - the UE shall set value of the '*HARQ process number*' field as indicated by higher layers.  - the UE shall set value of the '*NDI*' field as indicated by higher layers.  - the UE shall set value of the '*Redundancy version*' field as indicated by higher layers.  - the UE shall set value of the '*Source ID*' field as indicated by higher layers.  - the UE shall set value of the '*Destination ID*' field as indicated by higher layers.  - the UE shall set value of the '*HARQ feedback enabled/disabled indicator*' field as indicated by higher layers.  - the UE shall set value of the '*Zone ID*' field as indicated by higher layers.  - the UE shall set the '*Communication range requirement*' field as indicated by higher layers.  ~~- the UE shall set value of the ‘~~*~~CAPC~~*~~’ field as indicated by higher layers.~~  ~~- the UE shall set value of the ‘~~*~~Additional ID’~~* ~~field as indicated by higher layers.~~  ~~- the UE shall set value of the ‘~~*~~Remaining COT duration’~~* ~~field as indicated by higher layers.~~  The UE shall set the contents of the SCI format 2-C as follows:  - the UE shall set value of the *'HARQ process number'* field as indicated by higher layers.  - the UE shall set value of the '*NDI*' field as indicated by higher layers.  - the UE shall set value of the '*Redundancy version*' field as indicated by higher layers.  - the UE shall set value of the '*Source ID*' field as indicated by higher layers.  - the UE shall set value of the '*Destination ID*' field as indicated by higher layers.  - the UE shall set value of the '*HARQ feedback enabled/disabled indicator*' field as indicated by higher layers.  - the UE shall set value of the '*CSI request*' field as indicated by higher layers.  ~~- the UE shall set value of the ‘~~*~~CAPC~~*~~’ field as indicated by higher layers.~~  ~~- the UE shall set value of the ‘~~*~~Additional ID’~~* ~~field as indicated by higher layers.~~  ~~- the UE shall set value of the ‘~~*~~Remaining COT duration’~~* ~~field as indicated by higher layers.~~  - the UE shall set value of '*Providing/Requesting indicator*' field as indicated by higher layers.  Comment 3:  Suggest following red changes, details are:   * Need to remove “~~at maximum~~”: since there are always 2 in this case. * This is SL-BWP level. * “PSSCH resource allocation starts at the next symbol after each candidate starting symbol.”: this is need and similar to legacy sentence.   ==  - Within the slot, PSSCH resource allocation starts at symbol *sl-StartSymbol+1,* except when *startingSymbolFirst* and *startingSymbolSecond* are provided for the sidelink resource pool*.* If *startingSymbolFirst* and *startingSymbolSecond* are provided for a ~~sidelink resource pool~~ SL-BWP, there are ~~at maximum~~ 2 candidate starting symbols for PSSCH transmission for slots without PSFCH symbols.*.* PSSCH resource allocation starts at the next symbol after each candidate starting symbol.  Comment 4:  Add following “i.e.,” part to avoid any confusion.  ==  - = *sl-LengthSymbols* -2, where *sl-LengthSymbols* is the number of sidelink symbols within the slot provided by higher layers. If *startingSymbolFirst* and *startingSymbolSecond* are provided for a sidelink resource pool, the number of sidelink symbols assumed in transport block size determination is determined by a reference number of symbols, *numRefSymbolLength*, provided by higher layers, i.e., = *numRefSymbolLength* -2.  **Agreement**  If a resource pool includes slots with 2 candidate starting symbols for a PSCCH/PSSCH transmission, for TBS determination and 2nd SCI overhead, in TS 38.214 Clause 8.1.3.2:   * *L\_ref* replaces *sl-LengthSymbols*   + Value range of *L\_ref* is {7, 8, 9, 10, 11, 12, 13, 14} symbols * is determined in the same way as in legacy NR SL   Comment 5:  Suggest following red changes, details are:   * Re-place some sentences.   + MAC may not provide *rbSetsWithConsecutiveLBTFailure* every time resource selection is triggered. E.g., RAN2 may agree that once *rbSetsWithConsecutiveLBTFailure* is provided, it remains valid until another new list is provided, so there is no need to provide it every time resource selection is triggered. So this part needs to be re-placed. * Updated some wording to align with RAN2’s LS   ==  - the remaining packet delay budget;  ~~- If the higher layer parameter~~ *~~transmissionStructureForPSCCHandPSSCH~~* ~~is not provided, the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot is . If the higher layer parameter~~ *~~transmissionStructureForPSCCHandPSSCH~~* ~~is set to ‘contiguousRB', corresponds to the number of sub-channels within all used RB sets to be used for the PSCCH/PSSCH transmission in a slot. If the higher layer parameter~~ *~~transmissionStructureForPSCCHandPSSCH~~* ~~is set to ‘interlaceRB’, corresponds to the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot in each RB set,~~  - If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, the number of used RB sets for one PSCCH/PSSCH transmission, LRBset.  - the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot, ;   * + If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘contiguousRB', corresponds to the number of sub-channels within all used RB sets to be used for the PSCCH/PSSCH transmission in a slot.   + If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, corresponds to the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot in each RB set.   - optionally, the resource reservation interval, , in units of msec.  - if the higher layer requests the UE to determine a subset of resources from which the higher layer will select resources for PSSCH/PSCCH transmission as part of re-evaluation or pre-emption procedure, the higher layer provides a set of resources which may be subject to re-evaluation and a set of resources which may be subject to pre-emption.  - it is up to UE implementation to determine the subset of resources as requested by higher layers before or after the slot - , where is the slot with the smallest slot index among and , and is equal to , whereis defined in slots in Table 8.1.4-2 whereis the SCS configuration of the SL BWP.  - Optionally, the indication of resource selection mechanism.  ~~-~~ *~~rbSetsWithConsecutiveLBTFailure~~*~~, which indicates the RB sets where consecutive LBT failure has been indicated.~~  The following higher layer parameters affect this procedure:  *- …*  - Optionally, indication of whether UE is required to perform SL reception of PSCCH and RSRP measurement for partial sensing on slots in SL DRX inactive time as *sl-PartialSensingInactiveTime.*  - Optionally, *rbSetsWithConsecutiveLBTFailure*, which indicates the RB sets where consistent LBT failure has been detected.  ==  RAN2’s LS R1-2306174  RAN2 discussed mode 2 resource (re)selection due to the detection of consistent LBT (C-LBT) failure on an RB set, and made the following agreements:   * MAC informs PHY of the RB set information where SL C-LBT failure was detected. * During resource (re)selection, PHY excludes the resources for the RB set where C-LBT failure was detected.   Comment 6:  Suggest following red changes, details are:   * “~~of a RB set~~” seems unnecessary, and can be removed.   ==  If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘contiguousRB', the UE shall exclude candidate single-slot resource, whose lowest sub-channel ~~of a RB set~~ includes resource blocks of the intra-cell guardband PRBs, configured by higher layer parameter, *intraCellGuardBandsSL-List*.  Comment 7:  Suggest following red changes, details are:   * “If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, …” is needed since the following only applies to IRB case. * It seems the following in agreement is not captured yet. * *“Frequency domain resource of PSSCH transmission is determined by an intersection of the resource blocks of the indicated sub-channel(s) and the union of the indicated set of RB sets and intra-cell guard bands between the indicated RB sets, if any”*   ==  If *sl-MaxNumPerReserve* is 2 then    If *sl-MaxNumPerReserve* is3 then    where  - denotes the starting sub-channel index for the second resource  - denotes the starting sub-channel index for the third resource  - is the number of sub-channels in a resource pool, or if the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, the number of sub-channels in each RB set, provided according to the higher layer parameter *sl-NumSubchannel*  If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, the applied interlace index(s) in different RB sets are the same.  If the higher layer parameter *transmissionStructureForPSCCHandPSSCH* is set to ‘interlaceRB’, The starting RB set of the first resource is determined according to the clause [ABCDE]. The number of contiguously allocated RB sets for each of the N RB sets LRBset>1 and the starting RB set indexes of resources indicated by the received SCI format 1-A, except the resource in the slot where SCI format 1-A was received, are determined from "Frequency resource assignment" which is equal to a frequency RIV (FRIV) where.  If sl-MaxNumPerReserve is 2 then  If sl-MaxNumPerReserve is 3 then  where   * denotes the starting RB set index for the second resource * denotes the starting RB set index for the third resource * is the number of RB sets in a resource pool * is the number of RB sets for each of the indicated resources   **Agreement**  Regarding frequency domain resource indication for interlace RB-based PSSCH transmission, support the followings:   * Option A: Support that for one PSSCH transmission, the used interlace index(s) in different used RB sets are always the same * Option 1: Support explicitly indicating the used sub-channel index(s) and RB set index(s)   + Frequency domain resource of PSSCH transmission is determined by an intersection of the resource blocks of the indicated sub-channel(s) and the union of the indicated set of RB sets and intra-cell guard bands between the indicated RB sets, if any   + For a TB, the initial transmission and reservation of the resource(s) for retransmission(s) use the same number of sub-channel(s) and same number of RB set(s)     - FFS: whether additionally support different number of RB set(s) in such case while keeping total number of sub-channels unchanged between initial transmission and retransmission(s) for a TB   + … |  |
|  |  |  |