**3GPP TSG RAN WG1 Meeting #106bis-e R1-** **211xxxx**

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Agenda item:** 8.11.1.2

**Source:** Moderator (LG Electronics)

**Title:** Feature lead summary for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements

**Document for:** Discussion and information

1. **Draft proposals for Tuesday’s GTW (October 12th)**

The delegates in Asia would be difficult to have sufficient time to provide inputs on the questions related to the draft proposals in Section 1 before the start of Tuesday’s GTW session (i.e., October 12th 03:00am UTC), but if companies provide their views as much as they can **2 hours before the start of Tuesday’s GTW session**, I will update the draft proposals accordingly. To prepare/make more stable draft proposals for Tuesday’s GTW session, it would be highly appreciated if companies make comments as soon as possible. Also to make progress more efficiently, **I would like to encourage companies to directly provide “revised wording” or “new wording needed to be added”**. Note that further email discussion will be triggered for draft proposals that are not agreed in Tuesday’s GTW session by using the updated version of FL’s summary that reflects comments received during the GTW session.

* 1. **Scheme 1**

After reviewing contributions, for Condition 1-A-1 of Scheme 1, the following draft proposal is made on how to determine the preferred resource set when the inter-UE coordination information transmission is triggered by UE-B’s explicit request.

**Draft proposal 1**:

* *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*
  + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request*
    - *Priority value to be used for PSCCH/PSSCH transmission* 
      * *It replaces prio\_TX*
    - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*
      * *It replaces L\_subCH*
    - *Starting/ending time location of resource selection window*
      * *It replaces n+T\_1/n+T\_2*
    - *Resource reservation interval* 
      * *It replaces P\_rsvp\_TX*

**Question 1-1**: Do you agree Draft Proposal 1?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Comment** |
| Ericsson | | Yes, with minor changes | | In general, we are fine with the proposal from FL. However, we suggest removing “explicit request” right before the list of bullets. We need further discussion on the container/signalling before deciding the specific type of information that is contained in the request.  **Draft proposal 1**:   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B~~’s explicit request~~*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX* |
| Fraunhofer | | Yes | | We are supportive of the FL’s proposal.  The parameters listed in the proposal would provide UE-A with the adequate information to determine the candidate resource set relevant for UE-B’s transmission.  We are also fine with Ericsson’s proposed text change. |
| Intel | | Yes, with comments | | We would like to add an option when the same set of parameters is used for request- and condition-based feedback. It can help to unify solutions. In order to support it we propose to add system configuration for parameters used for feedback. In addition, we think procedure can be simplified if RSRP thresholds are fixed and are not adaptively incremented   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request or by system configuration*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*   *FFS if RSRP thresholds are fixed or adaptively adjusted to ensure that candidate resource set exceeds preconfigured value* |
| Qualcomm | | No | | Our evaluation results show that performance can be improved when UE-A is allowed to introduce additional criteria for selecting the preferred resource set compared to reusing Release-16 procedure. |
| Nokia, NSB | | Yes, with comments | | Number of sub-channels **OR message size (TBS**).  Rationale: If TBS is indicated by UE-B, the required number of sub-channels (L\_subCH) for UE-B’s transmission is determined at UE-A, which may be more optimal as only UE-A can estimate the expected SINR (and therefore MCS) for UE-B’s transmission (assuming UE-A is UE-B’s only intended receiver). |
| Futurewei | | Yes with comments | | We are generally ok with the information included. Other information shall included such as sensing related parameter and timing requirement, i.e., periodicity list, the time deadline that UE processing the sensing results & form the procedure and deadline that UE sends the coordination information, traffic types, , and remaining PDP.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*     - *Periodicity list*     - *Timing requirements for sensing and transmitting coordination information*     - *Traffic types*     - *Remaining PDB* |
| Apple | | Yes with comments | | UE-B’s explicit request also needs to indicate the number of resources to be selected (for each TB). This information is needed in UE-A’s resource selection procedure Step 2. |
| InterDigital | | Yes with comments | | We suggest to add   * + - *Resource pool index*       * *It replaces the resource pool from which the resources are to be reported*   Unless the resource pool is considered to be indicated implicitly by the resources of the explicit request transmission.  Also, we would like to consider this information can be sent by UE-B via RRC signaling.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B ~~UE-B’s explicit request~~*      - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX* |
| Convida Wireless | | Yes | | We are ok with the proposal. |
| Fujitsu | |  | | In our view, the ratio of candidate resources X% should also be included in UE-B’s explicit request. |
| OPPO | Comments | | We agree that at least the parameters in the list should be provided by UE-B, however, in addition to that, UE-A should firstly know the Tx resource pool used by UE-B, as the TX pool used by UE-A and UE-B may not be same.  We also support the proposal on RSRP threshold from Intel, as from UE-A perspective, it should determine the preferred resources based on the criterion that the PSCCH/PSSCH transmitted on the resources are decodable, there is no need to adjust the RSRP threshold.  We think “explicit request” should be removed, depending on the which parameters are included in the list, the signalling used for indicating the parameters may be different.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s ~~explicit request~~*      - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*     - *The transmission resource pool of UE-B*       * *It replaces “the resource pool from which the resources are to be reported”*   *FFS if RSRP thresholds are fixed or adaptively adjusted to ensure that candidate resource set exceeds preconfigured value* | |
| ZTE | Yes with comments | | We are in general fine with this proposal but prefer to add more critical components as :   * + Delay budget of UE-B’s transmission   + Expected resource granularity of UE-B’s transmission, i.e., the resource size. | |
| Lenovo&MotM | Yes with comments | | We haven’t discussed the aspects on the TX resource pool for inter-UE coordination. One case is that UE-B may trigger UE-A provide the set of resources on another resource pool.  We propose following modifications on the proposal   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*   *Resource pool index, if needed* | |
| NEC | Yes, comment | | We’re generally fine with the proposal and also we’d like to add:   * + - *The resource pool index*       * *It replaces “the resource pool from which the resources are to be reported”* | |
| NTT DOCOMO | Comment | | My reading of this proposal is that Condition 1-A-2 is precluded from determination conditions of preferred resources since Rel-16 behavior does not consider any future half-duplex situation. Is it correct understanding?  If correct, we do not support the proposal. Condition 1-A-2 should also be considered. | |
| xiaomi | Yes | | We support the proposal. | |
| Spreadtrum | Yes with comments | | We share the similar view with OPPO that UE-A should know the Tx resource pool used by UE-B.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*     - *The transmission resource pool of UE-B*       * *It replaces “the resource pool from which the resources are to be reported”* | |
| Samsung | See comment | | We think that the second bullet is redundant and remaining PDB can be signalled instead of time location of resource selection window.  We suggest following modification as   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *~~When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with~~ at least following parameters provided by UE-B’s ~~explicit request~~*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *~~Starting/ending time location of resource selection window~~ Remaining PDB*       * *It will decide~~replaces n+T\_1/n+~~T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX* | |
| Vivo | Comment | | 1. *Number of retransmission resource should be included* 2. *The starting time of the selection window should be determined by UE-A, based on the timing when receiving the request signaling and UE-A’s processing time to decode the request signaling and processing time to prepare the resource selection. Since UE-B is not aware of UE-A’s exact processing time, it is for UE-A to decide the n+T1.* 3. *‘the set of resources preferred for UE-B’s transmission’ should be selected from the candidate single-slot resources, those are not equal concept.*  * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission ~~is a form of~~ belongs to candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *~~Starting/~~ending time location of resource selection window*       * *It replaces ~~n+T\_1/~~n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*     - *Number of retransmission resources* | |

When UE-B receives the preferred resource set from UE-A, the following draft proposal is made on how to consider it in its resource (re-)selection.

**Draft proposal 2**:

* *For Option A of Scheme 1,*
  + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*
  + *Otherwise, UE-B uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection*
  + *FFS: value of the threshold*

**Question 1-2**: Do you agree Draft Proposal 2?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Comment** |
| Ericsson | | Yes | | We are supportive of this proposal. |
| Fraunhofer | | Yes, with comment | | We are supportive of the first sub-bullet, but do not agree with the second one.  If we understand the second bullet correctly, and please correct us if wrong, the UE will discard the preferred resource set entirely and use only the S\_A. We think that discarding a set of resources that have been corroborated to be collision free by UE-A is wasteful, and would rather work towards a solution that could use the intersection set and the remaining resources from S\_A. |
| Intel | | Yes, with comments | | We are fine with principle for the case when only preferred resource set is available but suggest some modifications. We assume the following 1) preferred resource set is aggregated based on feedback from multiple UEs, 2) preferred resource set is ordered according to priority of resource selection, 3) if size of intersection does not meet pre-configured threshold then intersection set is replenished by resources from S\_A until its size is equal to or exceeds threshold   * *For Option A of Scheme 1,*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*   + *Otherwise, UE-B replenishes the intersection set S\_AF till its size meets threshold by randomly adding remaining resources from set S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection*   + *FFS: value of the threshold*   We prefer to define unified procedure that can handle both preferred and non-preferred resource sets from feedback as well as TX candidate resource set. |
| Qualcomm | | Please see comments | | Before concluding on the proposal, some clarification is needed about the threshold value and whether it is an absolute value (e.g. number of resources in a set) or a ratio. Furthermore, it would be good to check the performance of such a scheme. Please note that our contribution provides results showing that the performance is worse than Option B and could even be worse than Rel-16 baseline.  Finally, it should be clarified that this proposal is independent from how to utilize the non-preferred resource set. |
| Nokia, NSB | | No | | UE-B performing Step 7 (i.e., increasing the RSRP threshold by 3dB to keep at least X% of candidates) makes no sense (and will unnecessarily harm UEs around UE-B).  For example, if M\_total=1000 and X=10%, UE-B would keep increasing its RSRP threshold until set S\_A has at least 100 resources, even though the intersection with UE-A’s preferred resource set may have been sufficiently large without increasing UE-B’s RSRP threshold even once. As a result, the degree of protection afforded to UEs around UE-B may decrease unnecessarily. |
| Futurewei | | Comments | | For option A, if the resources in the intersection set are less than required, then depending on attributes of UE-B and UE-A (if UE-A is leading truck or commander chief in a public safety fire scene) or configured UE-B behaviour, UE-B uses S\_A from its own sensing results or prioritize the resources in the preferred resource set. The proposed updates are   * *For Option A of Scheme 1,*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*   + *Otherwise, UE-B uses either S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection or the preferred resource set based on configured UE-B’s behavior or attributes of UE-A and UE-B*   + *FFS: value of the threshold* |
| Apple | | Yes with comments | | 1. We think it should be mentioned in the proposal that it is for a set of preferred resources.  2. If the number of intersection set is smaller than a threshold, then UE-B should prioritize the intersection set, and then select the remaining resources from S\_A.  3. We are not sure if the “threshold” is equal to the desired number of resources. If so, we could directly replace “threshold” by “desired number of resources”. If not, we could list the candidate of “threshold”.   * *When UE-B receives a set of preferred resources, for Option A of Scheme 1*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*   + *Otherwise, UE-B uses candidate single-slot resource(s) belonging to the intersection set, and then uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection for the remaining resources.*   *FFS: value of the threshold (e.g., number of desired resources to be selected)* |
| InterDigital | | Yes | | We agree with the proposal |
| Fujitsu | |  | | In our view, the preferred resource set can indicate resources with different degrees of preference. The most preferred resources will be firstly used to obtain the intersection. If the number of resources belonging to the intersection is small, then second preferred resources are used and so on. |
| OPPO | | Yes | | We support the proposal. If the resource in the intersection is smaller than the threshold, there are too many ways to utilize the resources in the preferred resource set, at this stage we prefer not to optimize the solution for this issue. |
| ZTE | No with comments | | In general, the information of UE coordination should be additional step to determine the resource set after the resource determination at UE-B side. With consideration on potential issue e.g., number of resource identified by other companies, in our view, it’s preferred that both identified resource set will be reported to higher layer | |
| Lenovo&MotM | Comments | | We propose the following modifications on the proposal:  **Draft proposal 2**:   * *For Option A of Scheme 1,*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*   + *Otherwise, UE-B uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 or only the preferred resource set in its resource (re-)selection*     - *FFS on how to select S\_A or the preferred resource set*   + *FFS: value of the threshold* | |
| NEC | Yes | |  | |
| NTT DOCOMO | No | | We have same comment as Nokia. Performing step 7 is not good way.  Besides, if step 7 is considered, then the proposal procedure is performed at PHY or MAC? This point should be clarified sufficiently. | |
| xiaomi | Yes | | We support the proposal. | |
| Spreadtrum | Yes with comments | | We share the similar view with Apple. For the second sub-bullet, when the number of candidate single-slot resources in intersection set is smaller than a threshold, UE-B should consider the intersection set firstly, and then select the remaining resources from S\_A.   * *For Option A of Scheme 1,*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*   + *Otherwise, UE-B uses candidate single-slot resource(s) belonging to the intersection set, and then uses the remaining resources in S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection*   + *FFS: value of the threshold* | |
| Samsung | No | | We don’t agree with the proposal as it assumes that the preferred resources are discarded if the threshold condition is not met.  We suggest following modification as   * *For Option A of Scheme 1, if UE-B’s sensing result is available*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*   + *Else the UE includes in the candidate single-slot resources, preferred resources that have been excluded by UE-B due to non-monitoring (step 5 of Rel-16 TS 38.214 Section 8.1.4). If the number of candidate single-slot resources is larger than or equal to a threshold, UE-B uses the candidate single-slot resource(s).*   + *Otherwise, it is up to UE-B’s implementation to determine a set of candidate single-slot resources that is larger than or equal to a threshold.*   + *~~Otherwise, UE-B uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection~~*   + *FFS: value of the threshold* | |
| vivo | See comment | | If the preferred resource does not belong to S\_A, the preferred resource is not selected by UE-B. After this step, MAC layer acquires a set of resources including preferred resource and other resource in S\_A; then if UE can select all the transmission resources from the preferred resources, it stops resource selection; if not, UE-B try the resources not belonging to the preferred resources. | |

As majority companies support Condition 1-A-2 for demining the preferred resource set, the the following draft proposal is made.

**Draft proposal 3**:

* *For Scheme 1 with preferred resource set, support following condition:*
  + *Condition 1-A-2:*
    - *Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*
      * *FFS: Other details (if any)*

**Question 1-3**: Do you agree Draft Proposal 3?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Comment** |
| Ericsson | | No | | For this proposal, we would like to get more clarification on the actual intention of “expect to perform SL reception from UE-B”. Is it due to UE-A’s/UE-B’s SL-DRX or due to its own transmission or any other restriction? |
| Fraunhofer | | Yes | | We are supportive of the FL’s proposal. |
| Intel | | No | | In our view this condition is applicable only to non-preferred resource set, otherwise it should be separately reported |
| Qualcomm | | No | | We don’t think this is necessary. Condition 1-A-1 is sufficient for generating the preferred resource set based on evaluation results. |
| Nokia, NSB | | Yes | |  |
| Futurewei | | Yes | | We support this proposal |
| Apple | | Yes | |  |
| InterDigital | | Yes | | We support the proposal |
| Convida Wireless | | Yes | | We are ok with the proposal. |
| Fujitsu | | Yes | | We are supportive of the proposal. |
| OPPO | | Yes with comments | | We suggest to clarify that it is due to half duplex.   * For Scheme 1 with preferred resource set, support following condition:   + Condition 1-A-2:     - Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation       * FFS: Other details (if any) |
| ZTE | No | | Clarification on the meaning of “does not expect to perform SL reception from UE-B” should be done. We will be fine to explicitly preclude the impacts due to half-duplex. | |
| Lenovo&MotM | Yes | |  | |
| NTT DOCOMO | Yes | | Support. | |
| xiaomi | Yes | | We support the proposal. | |
| Spreadtrum | Yes | | We support the proposal | |
| Samsung |  | | We agree with OPPO’s comment | |
| vivo | Yes | | The behaviour can be can be specified, since such behaviour is the best implementation. | |

Since companies’ views are divided on how to determine the non-preferred resource set, I list two options in the following draft proposal and suggest that RAN1 decides which option(s) are supported during RAN1#106bis-e meeting.

**Draft proposal 4**:

* *For Condition 1-B-1 of Scheme 1, RAN1 decides which option(s) are supported during RAN1#106bis-e meeting:*
  + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE*
  + *Option 2: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE when UE-A is a destination of a TB transmitted by the UE*

**Question 1-4**: Do you agree Draft Proposal 4?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Comment** |
| Ericsson | | No | | We propose to add a third option which can work as the combination of both options and is the simplest format to facilitate TX UE behaviour.  **Draft proposal 4**:   * *For Condition 1-B-1 of Scheme 1, ~~RAN1 decides which option(s) are supported during RAN1#106bis-e meeting:~~*   + *~~Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE~~*   + *~~Option 2: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE when UE-A is a destination of a TB transmitted by the UE~~*   + Option 3: Indicate in the IUC message the RSRP level and the case (i.e., destination/not destination of the TB). |
| Fraunhofer | | Option 1 | | We support option 1 because the selecting of non-preferred resources should not be restricted only when UE-A is the destination UE. Based on received SCIs from UE-B and another UE-C, it is possible for UE-A to detect that UE-B has indicated a resource for a future transmission that could collide with UE-C’s indicated resource. |
| Intel | | Yes, with modifications | | We propose to add Option 3 which is a combination of Option 1 and Option 2:  *Option 3: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is outside of RSRP range [RSRPmin RSRPmax], where RSRPmin and RSRPmax are pre-configured*  We are also fine with Option 3 proposed by Ericsson |
| Qualcomm | | Yes | | We’re ok with the proposal in general except the part about priority since there hasn’t been evaluation results for it.   * *For Condition 1-B-1 of Scheme 1, RAN1 decides which option(s) are supported during RAN1#106bis-e meeting:*   + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a (pre-)configured RSRP threshold ~~which is determined by at least priority value indicated~~ ~~by SCI of the UE~~*   + *Option 2: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a (pre-)configured RSRP threshold ~~which is determined by at least priority value indicated by SCI of the UE~~ when UE-A is a destination of a TB transmitted by the UE*   Separately, we prefer to start with more progress and agree on which option(s) to support directly rather than going through an intermediate step. The evaluation results in our contribution show that Option 2 provides gain whereas Option 1 does not. Further, Option 1 leads to larger sets of non-preferred resources. |
| Nokia, NSB | | Yes | | It’s impossible to overstate the importance of Option 2 to protect UE-A’s reception of other UE’s transmission. |
| Futurewei | | Comments | | For option 2, if the resource is reserved by another Tx UE to send data to UE-A, UE A can include it as non-preferred resource without comparing with a threshold.   * *For Condition 1-B-1 of Scheme 1, RAN1 decides which option(s) are supported during RAN1#106bis-e meeting:*   + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE*   + *Option 2: Reserved resource(s) of other UE identified by UE-A ~~whose RSRP measurement is smaller than a RSRP threshold~~ ~~which is determined by at least priority value~~ indicated by SCI of the UE when UE-A is a destination of a TB transmitted by the UE* |
| Apple | | Yes | | We support Option 1.  UE-A does not have to be a destination UE of the reservation when determining the set of non-preferred resources. |
| InterDigital | | Yes | | We support Option 1 |
| Fujitsu | | Yes | | We are fine to determine among the two options. In our view, both the options can be supported. |
| OPPO | | Yes | | Support Option 1, according to the working assumption of last meeting, in Scheme 1 UE-A is destination of UE-B. If UE-A is destination of more than one UEs and there are conflicting in future, UE-A should determine UE-B(i.e. which UE to receiver) from them first, and regard others as interferers. |
| ZTE | Yes | | We are supportive to Option-1 and resources reserved by other UEs which are identified by decoding SCI should also be taken as Non-preferred resource. | |
| Lenovo&MotM | Yes with comments | | We think that on Option 2 the restriction on RSRP measurement is not necessary.  **Draft proposal 4**:   * *For Condition 1-B-1 of Scheme 1, RAN1 decides which option(s) are supported during RAN1#106bis-e meeting:*   + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE*   *Option 2: Reserved resource(s) of other UE identified by UE-A ~~whose RSRP measurement is smaller than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE~~ when UE-A is a destination of a TB transmitted by the UE* | |
| NEC | Yes | |  | |
| NTT DOCOMO | Yes | | We support option 1. | |
| xiaomi | Yes | | We support Option 1. | |
| Spreadtrum | Yes | | We support Option 1 | |
| Samsung |  | | We prefer Option 1. But the wording is a bit unclear and can lead to misunderstanding. It is not clear which UE the proposal is referring to in: “*at least priority value indicated by SCI of the UE*”. Is this “the other UE”?  Maybe we can say:   * + *Option 1: Reserved resource(s) of other UE(s) identified by UE-A whose RSRP measurement is larger than a RSRP threshold which is determined by at least priority value indicated by SCI of the other UE(s)* | |
| vivo | See comment | | We propose another option modified from the option 2. Which means that the resource selected by UE-A is non-preferred resources. Resource reservation signalling for the UE-A’s transmission resource (including initial transmission) is regarded as coordination information.   * + *Option 3: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a RSRP threshold which is determined by at least priority value indicated by SCI of the UE ~~when UE-A is a destination of a TB transmitted by the UE~~* | |

Since companies’ views are divided on how/when UE-B excludes resource(s) overlapping with the non-preferred resource set in its resource (re-)selection, I list two options in the following draft proposal and suggest that RAN1 down-selects one of options during RAN1#106bis-e meeting.

**Draft proposal 5**:

* *For Scheme 1 with non-preferred resource set, RAN1 down-selects one of following options during RAN1#106bis-e meeting:* 
  + *Option 1: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*
  + *Option 2: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 6) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*

**Question 1-5**: Do you agree Draft Proposal 5?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Ericsson | See comment | In our view, Option 2 from the proposal is the best option to exclude resources during the re-selection.  We do not see much point on agreeing to the proposal as it is and instead prefer to agree directly on Option 2. However, if the group is fine with the current proposal and in order to make some progress, we can accept this proposal as intermediate step. |
| Fraunhofer | Option 2 | We prefer option 2 because the exclusion of non-preferred resources after step 6 would provide the UE with the opportunity to check whether the new candidate resource set is of the required size. If the exclusion is done after step 7, there is the possibility of the new candidate resource set being too small for resource selection. |
| Intel | Yes, for Option 1, with comments | We propose to work directly with set S\_A after Step 7), i.e., support Option 1 with modifications.  There is no need for hard exclusion from set S\_A after Step 7), which may reduce candidate resource set. We assume prioritization for resource selection based on feedback and TX sensing results using similar mechanism as for preferred resource sets, i.e.:  If the size of the set S\_AF formed by difference of the set S\_A and non-preferred resource set does not meet pre-configured threshold then set S\_AF is replenished by resources from S\_A until the size of set S\_AF exceeds thresholds  We suggest modified Option 1 and procedure that handles both preferred and non-preferred resource sets:   * + *Option 1: UE-B ~~excludes~~ in its resource (re-)selection finds difference of candidate single-slot resource(s) obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 and ~~overlapping with~~ the non-preferred resource set forming set S\_AF*   + *If size of the set S\_AF exceeds or equal to the pre-configured threshold UE selects resources from set S\_AF*   + *Otherwise set S\_AF is replenished by randomly selected resources from set S\_A* |
| Qualcomm | No | Similar to Question 1-4, we prefer to make progress more quickly and agree on the option, which, in our view, is neither of the two.  To provide a sufficiently large candidate resource set to upper layers, the exclusion should be immediately after initializing S\_A in Step 4) of Rel-16 TS 38.214 Section 8.1.4. |
| Nokia, NSB | No | The extent of overlap should be considered before excluding. For example, if a 10-subchannel candidate resource overlaps with a 10-subchannel non-preferred resource by just 1 subchannel, it may not be necessary to exclude the candidate resource (especially if UE-B’s RSRP threshold has already been increased too much). |
| Futurewei | Comments | We are generally ok with these two options for discussions. However, some clarifications are still needed. For Option 1, what if there is complete or partial overlapping between the non-preferred resources and the candidate set after step 7) so that the rest not enough for the transmissions. For option 2, what is the criterion in 7) cannot be satisfied, how to process these non-preferred resources when increasing the RSRP threshold.   * *For Scheme 1 with non-preferred resource set, RAN1 down-selects one of following options during RAN1#106bis-e meeting:*    + *Option 1: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*     - *FFS: details if the resource set after exclusion is not sufficient for data transmissions.*   + *Option 2: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 6) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*     - *FFS: details if the resource set after exclusion cannot satisfy the criterion in step 7)* |
| Apple | Yes | We are fine with either option. |
| InterDigital | Option 2 | In our view, the non-preferred resources are to be removed first before the RSRP threshold is adjusted when X% is not reach in Step 7 |
| Fujitsu |  | Generally fine to list the options. However, more details may be needed. For example, in our view, the non-preferred resources can be indicated with different degrees of preference. The most non-preferred resources will be firstly excluded. If the number of resources becomes too small, then second non-preferred resources can be excluded. |
| OPPO | Yes | We also prefer to directly agree to Option 2, as the number of resources reported to MAC layer should be guaranteed. |
| ZTE | No with comments | In general, similar as the solution defined for preferred resource, the information of UE coordination should be additional step to determine the resource set after the resource determination at UE-B side. With consideration on potential issue e.g., number of resource identified by other companies, in our view, it’s preferred that both identified resource set will be reported to higher layer for decision. Then, potential usage of resource even with overlapping between the reported non-preferred resources is still possible. |
| Lenovo&MotM | Yes | We prefer Option 2 |
| NTT DOCOMO |  | If option 1 is supported, PHY or MAC should be clarified.  If option 2 is to be supported, rather before step 6 is better. |
| xiaomi | Yes | In our view, the non-preferred resources are to be removed after UE-B determines a candidate resource set after Step 7. |
| Spreadtrum | Yes | We prefer option 2. |
| Samsung |  | We slightly prefer Option 2. We can discuss further about this issue. |
| vivo | Yes |  |

As majority companies support Condition 1-B-2 for demining the non-preferred resource set, the the following draft proposal is made.

**Draft proposal 6**:

* *For Scheme 1 with non-preferred resource set, support following condition:*
  + *Condition 1-B-2:*
    - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*
      * *FFS: Other details (if any)*

**Question 1-6**: Do you agree Draft Proposal 6?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Comment** |
| Ericsson | | No | | We have a similar comment as in Proposal 3. For this proposal, we would like to get more clarification on the actual intention of “expect to perform SL reception from UE-B”. |
| Fraunhofer | | Yes | | We are supportive of the FL’s proposal. |
| Intel | | Yes, with comments | | We would like to see this set to be separately indicated.  We think this set can be limited for unicast / groupcast communication.   * *For Scheme 1 with non-preferred resource set, support following condition:*   + *Condition 1-B-2:*     - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B* * *This set of non-preferred resources is separately indicated to UE-B* |
| Qualcomm | | Please see comments | | Our evaluation results show that the gain from half-duplex avoidance on its own, unlike half-duplex recovery, doesn’t provide meaningful gains.  We would be ok with the following updated version of the proposal:   * *Resource(s) ~~(e.g., slot(s)) where~~ UE-A~~, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B~~ selected for its own SL transmission(s)*   *FFS: Other details (if any)* |
| Nokia, NSB | | Yes | |  |
| Futurewei | | Yes | | We support this proposal |
| Apple | | Yes | |  |
| InterDigital | | Yes | | We support the proposal |
| Convida Wireless | | Yes | | We are ok with the proposal. |
| Fujitsu | | Yes | | We are fine with the proposal. |
| OPPO | Yes with comments | | We suggest to clarify that it is due to half duplex.   * *For Scheme 1 with non-preferred resource set, support following condition:*   + *Condition 1-B-2:*     - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex.*       * *FFS: Other details (if any)* | |
| ZTE | No | | Clarification on the meaning of “does not expect to perform SL reception from UE-B” should be done. We will be fine to define the non-preferred resource due to half-duplex. | |
| Lenovo&MotM | Yes | | We think it is essential to address half-duplex issue | |
| NEC | Yes | |  | |
| NTT DOCOMO | Yes | |  | |
| xiaomi | Yes | |  | |
| Spreadtrum | Yes | | We support the proposal | |
| Samsung |  | | In other than explicit request, UE-A might provide inter-UE co-ordination information to more than one UE-B, some of them might or might not be UEs transmitting to UE-A.  We suggest following modification as   * *For Scheme 1 with non-preferred resource set, when the inter-UE coordination information transmission is triggered by UE-B’s explicit request, support following condition:*   + *Condition 1-B-2:*     - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex.*       * *FFS: Other details (if any)* | |
| vivo | Yes | |  | |

* 1. **Scheme 2**

After reviewing contributions, I observed that for Condition 2-A-1 of Scheme 2, majority companies support defining at least additional criteria to check whether RSRP measurement on other UE’s reserved resource(s) fully/partially overlapping with resource(s) indicated by UE-B’s SCI is larger than a RSRP threshold. So, the following draft proposal is made.

**Draft proposal 7**:

* *For Condition 2-A-1 of Scheme 2, at least following additional criteria to determine resource(s) where expected/potential resource conflict occurs is supported*
  + *The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) whose RSRP measurement is larger than a RSRP threshold determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with following modifications:*
    - *prio\_TX is the priority value indicated by SCI for a TB having UE-A as its destination UE*
    - *prio\_RX is the priority value indicated by SCI for the conflicting TB other than the TB associated with prio\_TX*

**Question 2-1**: Do you agree Draft Proposal 7?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Ericsson | Yes, with minor edits | We are in general OK with this proposal, but we would like to get the following clarifications:   * Regarding the parameter prio\_TX, we suggest simplifying and saying prior\_TX is as indicated in UE-B’s SCI * We also think that it is good to clarify that this is no additional criteria (as stated in the main bullet) but clarification of the details of Condition 2-A-1. |
| Fraunhofer | Yes | We are supportive of the FL’s proposal. |
| Intel | No | We suggest to separately discuss how to detect expected/potential conflict and whether to report feedback for the expected/potential conflict. |
| Qualcomm | No | The important aspect about a collision isn’t the RSRP at UE-A but the difference in RSRPs between the conflicting transmissions. We propose the following update:   * *For Condition 2-A-1 of Scheme 2, at least following additional criteria to determine resource(s) where expected/potential resource conflict occurs is supported*   + *The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) whose RSRP measurement is within an RSRP threshold of the RSRP measurement of UE-B’s reserved resource. ~~is larger than a RSRP threshold determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with following modifications:~~*     - *~~prio\_TX is the priority value indicated by SCI for a TB having UE-A as its destination UE~~*     - *~~prio\_RX is the priority value indicated by SCI for the conflicting TB other than the TB associated with prio\_TX~~*   + *The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) and the other UE is within a distance threshold of UE-B as determined by both UEs’ SCIs.*   Also, we would like to clarify that this is only the condition to identify potential collision. Identifying a collision does not always trigger an indication. The condition to trigger an indication would need to be discussed separately. |
| Nokia, NSB | Yes, with comments | The proposed additional criteria applies only if UE-A is a destination UE of at least one of the conflicting TBs, so it is unclear, if this proposal is agreed, what the behaviour of Condition 2-A-1 is if UE-A is not a destination UE of any of the conflicting TBs. Suggest to clarify that Condition 2-A-1 applies only if UE-A is a destination UE. |
| Futurewei | Yes | We are ok with the proposal |
| Apple | No | It needs to be clarified “a RSRP threshold determined in the same way…”. In TS38.214 Section 8.1.4, the RSRP threshold is updated in each loop. Does the RSRP threshold in the proposal refer to the initial RSRP list?  Also, we prefer to have a separate configured RSRP threshold for inter-UE coordination scheme 2. This RSRP threshold may be different from the configured RSRP threshold for legacy resource selection. |
| Fujitsu | Yes | We are fine with the proposal. |
| OPPO | Yes | Fine with the proposal. |
| ZTE | Yes | We are fine with this proposal and regarding the description of Prior-Tx, it’s reasonable to mandate the UE-A as the destination UE of UE-B. |
| Lenovo&MotM | Yes |  |
| Nec | Yes |  |
| NTT DOCOMO | No | We do not think that RSRP threshold determination based on 214 selection procedure works well. So our view is similar to Apple. |
| xiaomi | Yes | We support the proposal. |
| Spreadtrum | Yes | We are ok with the proposal. |
| Samsung |  | The direction of the proposal is fine. Rather than referring to section 8.1.4, it would good to mention the details of the proposal here to avoid ambiguity. Therefore, we suggest:   * *For Condition 2-A-1 of Scheme 2, at least following additional criteria to determine resource(s) where expected/potential resource conflict occurs is supported*   + *The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) whose SL RSRP measurement is larger than a SL RSRP threshold ~~determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with following modifications~~ where the SL RSRP threshold depends on:*     - *~~prio\_TX is~~ the priority value indicated by SCI for a TB having UE-A as its destination UE*     - *~~prio\_RX is~~ the priority value indicated by SCI for the conflicting TB other than the TB associated with prio\_TX* |
| vivo | Yes |  |

For a container in which inter-UE coordination information is transmitted in Scheme 2, I observed that majority companies support using PSFCH format 0. So, the following draft proposal is made.

**Draft proposal 8**:

* *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*
  + *Set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set), period of PSFCH resources (sl-PSFCH-Period), number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair), number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType) and Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID) are separately (pre)configured*
    - *UE expects that sl-PSFCH-Period for inter-UE coordination information is not smaller than sl-PSFCH-Period for SL HARQ-ACK feedback in the same resource pool*
  + *UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least X slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*
    - *FFS: value of X*
  + *UE-A determines an index of a PSFCH resource for a PSFCH transmission in the same way according to Rel-16 TS 38.213 Section 16.3 with at least following modifications:*
    - *PSSCH reception is replaced with the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*
    - *M\_ID = 0*
    - *P\_ID is L1-source ID indicated by UE-B’s SCI*
  + *The following values of m\_cs are used to indicate expected/potential resource conflicts that satisfy different conditions*
    - *0: Condition 2-A-1*
    - *6: Condition 2-A-2*

**Question 2-2**: Do you agree Draft Proposal 8?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Ericsson | See comment | We propose the following modifications to this proposal:   * We propose to delete the second sub-bullet “UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least X slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs”   + In our view, this mechanism adds unnecessary extra signaling and wasted transmission of collision avoidance since it signals to UE-B even in cases where the pre-emption mechanism as defined in Rel-16 can solve the potential collision. Moreover, this approach tries to solve a corner case situation and the added signaling overhead does not justify the change in the procedure. * We also propose to remove the last sub-bullet “The following values of m\_cs are used to indicate expected/potential resource conflicts that satisfy different conditions”   + There is no need to differentiate between the different conditions for the expected/potential resource conflicts since the UE behavior will be the same regardless of the condition that trigger the signaling.   Therefore, we propose to have the following:  **Draft proposal 8**:   * *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*   + *Set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set), period of PSFCH resources (sl-PSFCH-Period), number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair), number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType) and Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID) are separately (pre)configured*     - *UE expects that sl-PSFCH-Period for inter-UE coordination information is not smaller than sl-PSFCH-Period for SL HARQ-ACK feedback in the same resource pool*   + *~~UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least X slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs~~*     - *~~FFS: value of X~~*   + *UE-A determines an index of a PSFCH resource for a PSFCH transmission in the same way according to Rel-16 TS 38.213 Section 16.3 with at least following modifications:*     - *PSSCH reception is replaced with the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*     - *M\_ID = 0*     - *P\_ID is L1-source ID indicated by UE-B’s SCI*   + *~~The following values of m\_cs are used to indicate expected/potential resource conflicts that satisfy different conditions~~*     - *~~0: Condition 2-A-1~~*     - *~~6: Condition 2-A-2~~* |
| Fraunhofer | Yes | We are supportive of the FL’s proposal. |
| Intel | Yes, with comments | We propose to add condition for detected conflict. |
| Qualcomm | No | Having different PSFCH period values for inter-UE coordination and for HARQ-ACK leads to unnecessary design complications. There is no need for a separate value and inter-UE coordination can go on any PSFCH symbol. Similarly, changing the maximum number of CS-pairs, hopping ID, candidate resource type is not needed. In particular, having different candidate resource type for inter-UE coordination and HARQ-ACK could cause collisions between the two.  The mapping from a conflicting SCI to a PSFCH symbol should be the same as the mapping from an SCI to the PSFCH symbol with its HARQ-ACK information to avoid unnecessary spec changes. If we reuse the existing time mapping, then there no need to redefine mapping as in the second bullet point. Further, reusing the mapping would provide UE-B with more time to change its selected resource.  We propose the following:   * *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*   + *Period of PSFCH resources (sl-PSFCH-Period), number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair), number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType) and Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID) are the same those used for HARQ-ACK.*   + *The set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set) is separately (pre)configured from the set used for HARQ-ACK*   + *Mapping from an SCI with conflict to the PSFCH symbol with inter-UE coordination is the same as in Rel-16 for HARQ-ACK.*   + *FFS other details* |
| Nokia, NSB | Yes |  |
| Futurewei | Comments | This proposal is too long for discussions. First we need to confirm WA for condition 2-A-2. For the first subbullet the detailed configurations, we may not need the separated configurations for all parameters. For the 3rd bullet, some change may be needed. Fir the fourth subbullet, the conflict type indication may be sent by the separated PSFCH entity or some other entity. Therefore, we suggest first agree with the PSFCH format 0.   * *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*   + *Reuse unused PSFCH resources to avoid the conflict with PSFCH associated to UE-B’s own or others’ PSSCH transmissions*   + *~~Set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set), period of PSFCH resources (sl-PSFCH-Period), number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair), number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType) and Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID) are separately (pre)configured~~*     - *~~UE expects that sl-PSFCH-Period for inter-UE coordination information is not smaller than sl-PSFCH-Period for SL HARQ-ACK feedback in the same resource pool~~*   + *~~UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least X slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs~~*     - *~~FFS: value of X~~*   + *~~UE-A determines an index of a PSFCH resource for a PSFCH transmission in the same way according to Rel-16 TS 38.213 Section 16.3 with at least following modifications:~~*     - *~~PSSCH reception is replaced with the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs~~*     - *~~M\_ID = 0~~*     - *~~P\_ID is L1-source ID indicated by UE-B’s SCI~~*   + *~~The following values of m\_cs are used to indicate expected/potential resource conflicts that satisfy different conditions~~*     - *~~0: Condition 2-A-1~~*     - *~~6: Condition 2-A-2~~* |
| Apple | No | Overall, we think the resource for inter-UE coordination is associated with the resource for reservation, rather than associated with the resource with potential collision.  Also, we prefer to reuse the scheme/mapping of determining PSFCH (for SL-HARQ) resources based on PSCCH/PSSCH. Hence, we do not agree with this proposal in principle.  For the first sub-bullet, we do not see the necessity to separately (pre)configure *“sl-PSFCH-Period”, “sl-NumMuxCS\_Pair”, “sl-PSFCH-CandidateResourceType” and “sl-PSFCH-HopID”.* All these parameters could be reused from PSFCH.  Since “*sl-PSFCH-Period*” is configured every 1, 2 or 4 slots, we do not see the necessity to have a different PSFCH periodicity for inter-UE coordination.  The only thing to be (pre)configure is “sl-PSFCH-RB-Set”.  For the second sub-bullet, we think the transmission time of inter-UE coordination could reuse that for sidelink HARQ-ACK. No need to enhance/optimize.  For the third sub-bullet, we think the first sub-sub-bullet should be removed.  For the last sub-bullet, we prefer not to indicate the condition in the feedback. It is unclear how to signal if a resource is not preferred due to both condition 2-A-1 and condition 2-A-2. |
| Fujitsu |  | We are generally fine with the direction except the last sub-bullet. |
| OPPO | Comments | Fine in general, however we did not see the necessity to differentiate conditions, so we suggest to remove the last sub-bullet.   * *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*   + *Set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set), period of PSFCH resources (sl-PSFCH-Period), number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair), number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType) and Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID) are separately (pre)configured*     - *UE expects that sl-PSFCH-Period for inter-UE coordination information is not smaller than sl-PSFCH-Period for SL HARQ-ACK feedback in the same resource pool*   + *UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least X slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*     - *FFS: value of X*   + *UE-A determines an index of a PSFCH resource for a PSFCH transmission in the same way according to Rel-16 TS 38.213 Section 16.3 with at least following modifications:*     - *PSSCH reception is replaced with the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*     - *M\_ID = 0*     - *P\_ID is L1-source ID indicated by UE-B’s SCI*   + *~~The following values of m\_cs are used to indicate expected/potential resource conflicts that satisfy different conditions~~*     - *~~0: Condition 2-A-1~~*     - *~~6: Condition 2-A-2~~* |
| Lenovo&MotM | No | Firstly, we think it is not necessary to configure another sl-PSFCH-Period for inter-UE coordination, it can be the same with the sl-PSFCH-Period for SL HARQ feedback.  Secondly on the second sub-bullet we think that the UE can transmit the PSFCH associated with the UE-B’s SCI with reserved resource, not only associated with the PSSCH resource with resource conflict occurs.  Thirdly if UE-A detects two reserved resources are conflict, it is not necessary to transmit two PSFCHs for each UE-B, if so both UE-Bs will perform resource re-selection, we think UE-A can select one PSFCH for transmission. |
| NEC | Yes |  |
| NTT DOCOMO | Comment | Before saying support/not support, this proposal is too long. Let’s discuss one-by-one to have easy agreements... |
| xiaomi | Comment | We are general fine with proposal, it is not necessary to differentiate conditions, so we suggest to remove the last sub-bullet. |
| Spreadtrum | Yes | We are ok with the proposal generally. But this proposal is too long. It’s difficult to make a consensus for the whole proposal directly. So we prefer the modification of Futurewei. |
| Samsung | NO | We don’t agree with all the details in this proposal.  The main bullet is fine.  First sub-bullet is not fine. It may introduce too large overhead by configuring all parameters separately. We think that some of these parameters can reuse the HARQ-ACK PSFCH parameters, other parameters can be configured separately we need to discuss.  Section and third sub-bullets, we don’t agree. There are two ways to determine the PSFCH resource of conflict:   * Based on the resource used to reserve the resource * Based on the reserved resource.   This proposal assumes the latter. This might not work in many scenarios. For example, if two users are reserving the same resource, this resource will be in conflict for one user but not in conflict for the other, how to indicate this information separately for each user. With this proposal if the resource is in conflict no UE can use it. This is not good for the overall system performance.  The former, uses the method agree for HARQ-ACK feedback on PSFCH, so might be more simple to implement in the specifications, and doesn’t suffer from previously mention issue.  Last sub-bullet, don’t agree. What is the benefit of distinguishing Condition 2-A-1 and 2-A-2 are UE-B. |
| vivo | Yes in principle | 1. Rel-16 and Rel-17 PSFCH configuration are independent, we are clear about the motivation to set any configuration expectation. 2. Whether/how to distinguish the conditions 2-A-1 and 2-A-2 can be further studied, we are not sure about the motivation for now.   **Draft proposal 8**:   * *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*   + *Set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set), period of PSFCH resources (sl-PSFCH-Period), number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair), number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType) and Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID) are separately (pre)configured*     - *~~UE expects that sl-PSFCH-Period for inter-UE coordination information is not smaller than sl-PSFCH-Period for SL HARQ-ACK feedback in the same resource pool~~*   + *UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least X slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*     - *FFS: value of X*   + *UE-A determines an index of a PSFCH resource for a PSFCH transmission in the same way according to Rel-16 TS 38.213 Section 16.3 with at least following modifications:*     - *PSSCH reception is replaced with the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs*     - *M\_ID = 0*     - *P\_ID is L1-source ID indicated by UE-B’s SCI*   + *~~The following values of m\_cs are used to indicate expected/potential resource conflicts that satisfy different conditions~~*     - *~~0: Condition 2-A-1~~*     - *~~6: Condition 2-A-2~~* |

* 1. **Updated draft proposals**
     1. **Scheme 1**

**Draft proposal 1**:

* *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*
  + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B. FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.*
    - *Priority value to be used for PSCCH/PSSCH transmission* 
      * *It replaces prio\_TX*
    - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*
      * *It replaces L\_subCH*
    - *Starting/ending time location of resource selection window*
      * *It replaces n+T\_1/n+T\_2*
    - *Resource reservation interval* 
      * *It replaces P\_rsvp\_TX*

**Draft proposal 2**:

* *For Option A of Scheme 1,*
  + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*
  + *Otherwise, down-select one of followings:* 
    - *Option 1: UE-B uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 in its resource (re-)selection*
    - *Option 2: UE-B first uses candidate single-slot resource(s) belonging to the intersection set, and then further uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 outside the intersection in its resource (re-)selection if necessary.*
  + *FFS: value of the threshold*

**Draft proposal 4**:

* *For Condition 1-B-1 of Scheme 1, down-select one or more of followings during RAN1#106bis-e meeting:*
  + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE*
  + *Option 2: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE when UE-A is a destination of a TB transmitted by the UE*
  + *Option 3: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is outside of (pre)configured RSRP range [RSRPmin RSRPmax], where RSRPmin and RSRPmax are determined by at least priority value*

**Draft proposal 5**:

* *For Scheme 1 with non-preferred resource set, down-select one of followings during RAN1#106bis-e meeting:* 
  + *Option 1: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*
  + *Option 2: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 6) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*
  + *Option 3: UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 4) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*

**Draft proposal 6**:

* *For Scheme 1 with non-preferred resource set, support following condition:*
  + *Condition 1-B-2:*
    - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation*
      * *FFS: Other details (if any)*
    1. **Scheme 2**

**Draft proposal 7**:

* *For Condition 2-A-1 of Scheme 2, down-select one or more of following additional criteria to determine resource(s) where expected/potential resource conflict occurs*
  + *Option 1: The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) whose RSRP measurement is larger than a RSRP threshold determined in the same way according to Step 3) of Rel-16 TS 38.214 Section 8.1.4 with following modifications:*
    - *prio\_TX is the priority value indicated by SCI for a TB having UE-A as its destination UE*
    - *prio\_RX is the priority value indicated by SCI for the conflicting TB other than the TB associated with prio\_TX*
  + *Option 2: The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) whose RSRP measurement is within a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.*
  + *Option 3: The resource(s) are fully/partially overlapping with other UE’s reserved resource(s) and the other UE is within a distance threshold of UE-B as determined by both UEs’ SCIs.*

**Draft proposal 8**:

* *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*
  + *At least set of PRBs for PSFCH transmission and reception (sl-PSFCH-RB-Set) is separately (pre)configured*

**Draft proposal 9**:

* *For determining PSFCH resource in Scheme 2, down-select one of followings:*
  + *Option 1: PSFCH occasion is derived by a slot where UE-B’s SCI is transmitted*
  + *Option 2: PSFCH occasion is derived by a slot where expected/potential resource conflict occurs on PSSCH resource indicated by UE-B’s SCI*

1. **1st round of** **email discussion**

I ask companies to provide inputs on **the questions in Section 2.4**, and its deadline for companies to provide inputs is **October 13th 4:59am UTC**. To prepare/make more stable draft proposals before the start of the next GTW session, it would be highly appreciated if companies make comments as soon as possible. Also to make progress more efficiently, **I would like to encourage companies to directly provide “revised wording” or “new wording needed to be added”**.

Regarding **the questions in Section 2.1/2.2/2.3**, considering the requests of several companies for more time, the deadline for companies to provide inputs is **October 13th 11:59am UTC**. Note that since these questions are important to resolve the remaining essential issues, it would be highly appreciated if companies make comments as soon as possible.

* 1. **Scheme 1**
     1. **Details on condition(s) of being UE-A and/or UE-B**

**Question 1-1**: For inter-UE coordination information triggered by UE-B’s explicit request in Scheme 1, if UE-A is a destination UE of a TB transmitted by UE-B, what is the cast type of the explicit request signaling from UE-B to UE-A. Please provide rationales for your answer.

* Option 1: Unicast
* Option 2: Groupcast
* Option 3: Broadcast
* Option 4: Same cast type of TB transmission from UE-B to UE-A

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 1 and 2 | If single UE-Ais requested for coordination, unicast is used. If multiple UE-As are request, either unicast or groupcast can be applied. Signalling overhead for explicit request can be reduced via groupcast for multiple UE-A’s assisting one UE-B. |
|  |  |  |
|  |  |  |

**Question 1-2**: For inter-UE coordination information triggered by UE-B’s explicit request in Scheme 1, if UE-A is a destination UE of a TB transmitted by UE-B, what is the cast type of the inter-UE coordination information signaling from UE-A to UE-B. Please provide rationales for your answer.

* Option 1: Unicast
* Option 2: Groupcast
* Option 3: Broadcast
* Option 4: Same cast type of the corresponding explicit request signaling
* Option 5: Same cast type of TB transmission from UE-B to UE-A

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 1 with comments | Different UE-A may have different preferred and/or non-preferred resource sets. Option 1 is a natural choice. Currently, other UEs’ preferred or non-preferred resource set have not been agreed as the information to obtain coordination information in Scheme 1, otherwise, option 2 and 3 can be considered. |
|  |  |  |
|  |  |  |
|  |  |  |

**Question 1-3**: For inter-UE coordination information triggered by UE-B’s explicit request in Scheme 1, what is condition(s) to trigger a transmission of the explicit request to UE-A? Please provide rationales for your answer.

* Option 1: When UE-B decide to trigger resource (re)selection for PSCCH/PSSCH transmission to UE-A
* Option 2: Up to UE implementation
* Option 3: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Comments | We are not clear what is exact difference between option 1 and 2 based on current wording (option 1 says “when UE-B decide”, seems also up to UE-B implementation). Inter-UE coordination can be configured via high layer. Once inter-UE coordination is configured when establishing SL communication. Explicit request can be triggered by UE-B anytime during the inter-UE coordination mode. |
|  |  |  |
|  |  |  |
|  |  |  |

**Question 1-4**: For inter-UE coordination information triggered by UE-B’s explicit request in Scheme 1, is there a possibility of that UE-A does not transmit the inter-UE coordination information even though it received the explicit request? Please provide rationales for your answer.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | There could be two scenarios for UE-B does not receive the coordination. One is that UE-A does not transmit the inter-UE coordination because UE-A does not have enough sensing time, cannot meet the timing requirement, sensing/transmitting coordination, or does not receive related triggering information for UE-A deriving appropriate coordination information. The other scenario is that UE-B fails to detect the coordination information.  Therefore the answer is Yes. But for most UEs (if not all UEs), they have to try to the best of their ability to form and send the coordination information (i.e., not up to whether or not they feel like it). The reason for UE-B not receiving the coordination is the first scenario only for these most (or all) UEs. But the UE-B cannot tell this because of the second scenario. |
|  |  |  |
|  |  |  |

**Question 1-5**: In Scheme 1, do you agree to confirm the following working assumption? Please provide rationales for your answer.

* *Agreement:*
  + *In scheme 1, the following is supported for UE(s) to be UE-A(s)/UE-B(s) in the inter-UE coordination information transmission triggered by an explicit request in Mode 2:*
    - *A UE that sends an explicit request for inter-UE coordination information can be UE-B*
    - *A UE that received an explicit request from UE-B and sends inter-UE coordination information to the UE-B can be UE-A*
    - *(Working assumption) At least a destination UE of a TB transmitted by UE-B can be UE A*
    - *The above feature can be enabled or disabled or controlled by (pre-)configuration*
      * *FFS: Details on how to support this, including (pre-)configuration signaling granularity*
    - *FFS: Additional details and conditions on UE-A and UE-B*

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | We are ok to confirm the WA. |
|  |  |  |
|  |  |  |

**Question 1-6**: For inter-UE coordination information triggered by a condition other than explicit request reception in Scheme 1, what is the relationship between UE-A and UE-B? Please provide rationales for your answer.

* Option 1: UE-A is an only destination UE of a TB transmitted by UE-B
* Option 2: UE-A and UE-B is determined by higher layer
* Option 3: Others (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 2 and 3 | We propose at least including two options. First one is option 2, UE-A and UE-B can be configured by higher layer. There are some typical scenarios, e.g., RSU, truck platooning, where RSU and leading truck can be configured as UE-A to provide coordination information. The second one is modified option 1, UE-A is a destination UE of a TB transmitted by UE-B. It can be triggered that UE-A detects an expected/potential conflict as in scheme 2 and transmit the preferred/non-preferred resource sets in addition to the conflict indication in scheme 2. |
|  |  |  |
|  |  |  |

**Question 1-7**: For inter-UE coordination information triggered by a condition other than explicit request reception in Scheme 1, what is the cast type of the inter-UE coordination information signaling from UE-A to UE-B. Please provide rationales for your answer.

* Option 1: Unicast
* Option 2: Groupcast
* Option 3: Broadcast
* Option 4: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | At least Option 1, 2 | Unicast should be supported for coordination triggered by a condition. For RSU and truck platooning cases, groupcast can be used to send coordination information, e.g., RSU/leading truck send non-preferred resource set to protect their own transmission/reception. |
|  |  |  |
|  |  |  |

**Question 1-8**: For inter-UE coordination information triggered by a condition other than explicit request reception in Scheme 1, what is condition(s) to trigger a transmission of UE-A’s inter-UE coordination information to UE-B? Please provide rationales for your answer.

* Option 1: When UE-A identifies that UE-B’s reserved resource(s) are overlapping with the non-preferred resource set
* Option 2: Up to UE implementation
* Option 3: When contents of the inter-UE coordination information are changed
* Option 4: When UE-A receives a TB from its intended transmitter
* Option 5: When the number of failure of TB decoding at UE-A side is larger than a threshold
* Option 6: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Comments | At least include option 1, 2, and 5. For option 1, UE-A detects an expected conflict and then send the preferred or non-preferred resource sets as coordination information. For option 2, for public safety, RSU, and truck platooning scenarios, based on high layer configurations, UE-A can start to transmit the coordination information when certain condition(s) are met, e.g., CBR, priority of its transmission or reception from other UEs, etc. These conditions can also be specified with configuration parameters, which become option 6, when one or more conditions, e.g., CBR, priority, etc, reaches the configured thresholds. |
|  |  |  |
|  |  |  |

**Question 1-9**: In Scheme 1, do you agree to confirm the following working assumption? Please provide rationales for your answer.

* *(Working Assumption) In scheme 1, the following is supported for UE(s) to be UE-A(s)/UE-B(s) in the inter-UE coordination information transmission triggered by a condition other than explicit request reception in Mode 2:*
  + *A UE that satisfies the condition mentioned in the main bullet and sends inter-UE coordination information is UE-A*
  + *A UE that received inter-UE coordination information from UE-A and uses it for resource (re-)selection is UE-B*
  + *The above feature can be enabled or disabled or controlled by (pre-)configuration*
    - *FFS: Details on how to support this, including (pre-)configuration signaling granularity*
  + *FFS: Additional details and conditions on UE-A and UE-B*

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | As commented for questions 1-7 and 1-8, we agree to confirm this working assumption. |
|  |  |  |
|  |  |  |

* + 1. **Details on condition(s) to determine inter-UE coordination information**

**Question 1-10**: In Condition 1-A-1, for inter-UE coordination information transmission triggered by a condition other than explicit request reception, how UE-A determines the RSRP threshold? Please provide rationales for your answer.

* Option 1: Reuse RSRP threshold as specified in Rel-16 TS 38.214 Section 8.1.4 which is determined by prio\_TX and prio\_RX. prio\_RX is indicated by other UE’s SCI.
  + Option 1-1: prio\_TX is (pre)configured.
  + Option 1-2: prio\_TX is PC5-RRC signaled
  + Option 1-3: prio\_TX is indicated by UE-B’s prior SCI
* Option 2: RSRP threshold is separately (pre)configured.
  + Option 2-1: RSRP threshold can be different depending on prio\_RX indicated by other UE’s SCI.
  + Option 2-2: RSRP threshold is the same across different prio\_RX indicated by other UEs’ SCI.
* Option 3: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 1  And option 3 | All options in option 1 can be supported for different scenarios. Prio\_Tx can be (pre)configured at either UE-B or UE-A. If it is at UE-B, PC5-RRC signalling is needed. Option 1-3 is necessary to support scheme 1 in conjunction with scheme 2.  On the other hand, the coordination is triggered by a condition by high layer signalling. Once coordination is triggered, UE-B can keep send the information to UE-A for UE-A forming and sending the coordination information for UE-B. |
|  |  |  |
|  |  |  |

**Question 1-11**: In Condition 1-A-1, for inter-UE coordination information triggered by a condition other than explicit request reception, please provide your views on whether/how to set each of following parameters.

* Priority value to be used for PSCCH/PSSCH transmission
* Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot
* Starting/ending time location of resource selection window
* Resource reservation interval
* Other parameters (please specify it)

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | For preferred resource set in the coordination triggered by a condition, the first four parameters can be configured at UE-A. Priority value may not be the same as the one used for PSSCH transmission at UE-B. The number of sub-channel can be configure at a fairly large value to cover most cases of UE-B’s transmission. These parameters or part of parameters can be sent to UE-B if they are helpful for UE-B’s resource selection.  On the other hand, even for coordination triggered by condition. These parameters can still be sent by UE-B with explicit request of coordination from UE-B.  The priority value, number of sub-channels, and resource reservation interval can also be obtained by UE-A detecting UE-B’s prior SCI. For example, if the coordination scheme 1 is combined with scheme 2 in one coordination process, i.e., UE-A not only sends the conflict indicator as in scheme 2 but also sends the coordination information of preferred/non-preferred set as in scheme 1, the priority value, number of sub-channels, resource reservation interval can be detected from SCI transmitted by UE-B. UE-A can form the resource selection window based on location of the initial scheduled PSSCH by UE-B. |
|  |  |
|  |  |

**Question 1-12**: For the set of resources non-preferred for UE-B’s transmission, what is a form of the resource(s)? Please provide rationales for your answer.

* Option 1: Set of sub-channels indicated by other UE’s SCI
* Option 2: Set of candidate single-slot resources overlapping with sub-channel(s) indicated by other UE’s SCI as specified in Rel-16 TS 38.214 Section 8.1.4
* Option 3: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 2 and 3 | Option 2 is for the resources occupied by other UE. We propose to also include Option 3: the slots where UE-A cannot perform SL reception, e.g., half duplex issue. |
|  |  |  |
|  |  |  |

**Question 1-13**: For Condition 1-B-1, if inter-UE coordination information is triggered by an explicit request, please provide your views on whether each of following parameters is provided by the explicit request.

* Priority value to be used for PSCCH/PSSCH transmission
* Number of sub-channels to be used for PSSCH/PSCCH transmission
* Starting/ending time location of resource selection window
* Resource reservation interval
* Other parameters (please specify it)

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | For non-preferred resource set, at least the following parameters are needed   * Priority value to be used for PSCCH/PSSCH transmission * Number of sub-channels to be used for PSSCH/PSCCH transmission * Starting/ending time location of resource selection window * Resource reservation interval   Other than these, the RSRP threshold is also needed to determine the non-preferred resource from sensing results |
|  |  |
|  |  |

**Question 1-14**: For Condition 1-B-1, if inter-UE coordination information is triggered by a condition other than explicit request reception, please provide your views on whether/how to set each of following parameters.

* Priority value to be used for PSCCH/PSSCH transmission
* Number of sub-channels to be used for PSSCH/PSCCH transmission
* Starting/ending time location of resource selection window
* Resource reservation interval
* Other parameters (please specify it)

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | Similarly, as for Q1-13, at least the following parameters are needed   * Priority value to be used for PSCCH/PSSCH transmission * Number of sub-channels to be used for PSSCH/PSCCH transmission * Starting/ending time location of resource selection window * Resource reservation interval * RSRP threshold to determine the non-preferred resource set.   As commented before, without explicit triggering, the first four parameters can still be sent by UE-B to UE-A for UE-A to form coordination information. RSRP threshold can be pre-configured. As also commented before, the priority value, number of subchannels, and resource reservation interval can also be detected from UE-B’s SCI.  If UE-B is not required to send the first four parameters, these parameters can be configured at UE-A (Priority value may not be the same as the one used for PSSCH transmission at UE-B. The number of subchannel can be configured in a small granularity. These parameters can be sent to UE-B (note that number of subchannels is needed for UE-B) |
|  |  |
|  |  |

**Question 1-15**: In Condition 1-B-1, if RSRP threshold is introduced to determine whether other UE’s reserved resource(s) are included in the non-preferred resource set or not, please provide your views on whether it is associated with parameter(s) other than the priority value indicated by other UE’s SCI. Please provide rationales for your answer.

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | The RSRP threshold can be signalled as an independent arbitrary value or an offset on the initial RSRP threshold based on the priority value for UE-B transmission and priority value indicated by other UE’s SCI. |
|  |  |
|  |  |

* + 1. **Details on indication mechanism for the set of resources**

**Question 1-16**: For the set of resources in Scheme 1, which option is supported for its indication mechanism? Please provide further details on the preferred option(s) if necessary.

* Option 1: Reuse a single or multiple combinations of TRIV, FRIV, resource reservation period as specified in Rel-16 TS 38.214 Section 8.1.5 with following modification [27][33]:
  + First resource location of each TRIV is separately indicated by the inter-UE coordination information
  + For each pair of TRIV and FRIV, up to 2 additional resources can be indicated
* Option 2: Reuse a single combination of TRIV and FRIV as specified in Rel-16 TS 38.214 Section 8.1.5 with following modification [3]:
  + For TRIV, window size of 32 slots is replaced with a larger value
  + For FRIV, only combinations of starting sub-channels are indicated
  + For a pair of TRIV and FRIV, more than 2 additional resources can be indicated
* Option 3: 2-dimensional resource bitmap [1][30]
  + Each bit indicates whether a pair of sub-channel(s) and slot(s) is included in inter-UE coordination information
* Option 4: 2-dimensional resource indicator value [3]
  + Each value is associated with a pair of sub-channel(s) and slot(s) is included in inter-UE coordination information
* Option 5: Others (please specify)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | comment | We support to reuse a single or multiple combinations of TRIV, FRIV with certain modifications as in option 1. But in addition, for non-preferred resource set, the TRIV alone can be used to indicate the slots for half-duplex issue.  We are also open to option 3 which is a simple approach requiring fewer standard efforts. However, we prefer to include additional 1-d map if only sending the time slots as the non-preferred resources due to half-duplex issue. |
|  |  |  |
|  |  |  |

**Question 1-17**: For Scheme 1, what parameter(s) other than indication of the set of resources as in Q1-16 are included in the inter-UE coordination information? Please provide rationales for your answer.

* Option 1: Type of resource set
* Option 2: Identifier to identify a UE transmitting/receiving this coordination information
* Option 3: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | At least option 1 | Since two types of resource sets may be multiplexed and transmitted in one message, the information on the type of resource set is needed. |
|  |  |  |
|  |  |  |

* + 1. **Details on timeline for inter-UE coordination information**

**Question 1-18**: In Condition 1-A-1/1-B-1, when UE-A receives an explicit request from UE-B in slot n or determines that a condition to trigger inter-UE coordination information transmission is met in slot n, please provide your views on whether/how to define time window where UE-A monitors other UE’s SCI for determining the set of resources. Please provide rationales for your answer.

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | A timing window can be configured for UE-A sending coordination information. For periodic transmission at UE-B, UE-A can send coordination information in a slot in [n-Tr, n-Tproc,0]. UE-A needs to complete sensing before n-Tr-Tproc,o -Tproc,1. For aperiodic transmission at UE-B, UE-A can send coordination within a window that ends by n+T1,c-Tproc,1, where T1,c is the T1 of coordination at UE-B. |
|  |  |
|  |  |

**Question 1-19**: In Condition 1-A-1/1-B-1, when UE-A receives an explicit request from UE-B in slot n or determines that a condition to trigger inter-UE coordination information transmission is met in slot n, please provide your views on what is the earliest timing when UE-A can transmit inter-UE coordination information. Please provide rationales for your answer.

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | For periodic traffic, UE-A can send coordination before data triggering slot n’. So rather a latest timing is specified. For aperiodic traffic, if UE-A performs full sensing, the earliest possible would be after UE-A receives the request and time for processing sensing results and resource selection for transmission coordination. Therefore, the earliest timing can be n+Tproc,0+ Tproc,1 (note that here n is explicit request slot, not the data triggering slot at UE-B) |
|  |  |
|  |  |

**Question 1-20**: In Condition 1-A-1/1-B-1, if UE-B receives inter-UE coordination information in slot n, what is the earliest timing when UE-B can use it in its resource (re)selection. Please provide rationales for your answer.

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | The earliest timing when UE-B can use it in resource (re)selection is n+Tproc,0. If the slot coordination information transmission is known at UE-B in advance, UE-B can process its own sensing results before n and use the coordination information at n+1. |
|  |  |
|  |  |

* + 1. **Details on container(s) of the inter-UE coordination information and its explicit request**

[To be discussed after stabilizing contents of the inter-UE coordination information and its explicit request and condition(s) for determining the inter-UE coordination information]

* 1. **Scheme 2**
     1. **Details on condition(s) of being UE-A and/or UE-B**

**Question 2-1**: For Scheme 2, if UE-A is a destination UE of a TB transmitted by UE-B, what is the cast type of TB transmission from UE-B to UE-A. Please provide rationales for your answer.

* Option 1: Unicast
* Option 2: Groupcast
* Option 3: Broadcast

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | At least Unicast and groupcast | Scheme 2 can be supported for both unicast and groupcast. We are also open for broadcast, as long as UE-B is able to detect PSFCH and receive the coordination information. |
|  |  |  |
|  |  |  |

**Question 2-2**: For Scheme 2, if UE-A is a non-destination UE of TB transmitted by UE-B, what is the cast type of TB transmission from UE-B. Please provide rationales for your answer.

* Option 1: Unicast
* Option 2: Groupcast
* Option 3: Broadcast

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 1 and 2 | In the cases of RSU, truck platooning case, or public safety (fire scene), the RSU, leading truck, or commander UE can send the coordination information even it is not a receiver or one of the receives for other UE’s transmission. |
|  |  |  |
|  |  |  |

**Question 2-3**: In Scheme 2, whether/how UE-A knows that UE-B is capable of receiving inter-UE coordination information and taking into account it in its resource re-selection? Please provide further details if necessary and rationales for your answer.

* Option 1: UE-B’s SCI indicates whether UE-B has such a capability or not.
* Option 2: UE-A is provided with whether UE-B has such a capability or not via PC5-RRC signaling.
* Option 3: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Futurewei | Option 2 | We prefer option 2 as it is UE capability issue which needs signalling exchange on UE feature. |
|  |  |  |
|  |  |  |

**Question 2-4**: In Scheme 2, do you agree to confirm the following working assumption? Please provide rationales for your answer.

* *Agreement:*
  + *In scheme 2, at least the following is supported for UE(s) to be UE-A(s)/UE-B(s) in the inter-UE coordination transmission triggered by a detection of expected/potential resource conflict(s) in Mode 2:*
    - *A UE that transmitted PSCCH/PSSCH with SCI indicating reserved resource(s) to be used for its transmission, received inter-UE coordination information from UE-A indicating expected/potential resource conflict(s) for the reserved resource(s), and uses it to determine resource re-selection is UE-B*
    - *A UE that detects expected/potential resource conflict(s) on resource(s) indicated by UE-B’s SCI sends inter-UE coordination information to UE-B, subject to satisfy one of the following conditions, is UE-A*
      * *(Working assumption) At least a destination UE of one of the conflicting TBs, i.e., TBs to be transmitted in the expected/potential conflicting resource(s)*
        + *Whether a non-destination UE of a TB transmitted by UE-B can be UE-A is (pre-)configured*
      * *FFS: Additional details and condition(s) on UE-A and UE-B*
    - *The above feature can be enabled or disabled or controlled by (pre-)configuration*
      * *FFS: Details on how to support this, including (pre-)configuration signaling granularity*
    - *FFS: Definition of expected/potential resource conflict(s) and other details (if any)*

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | We agree to confirm this working assumption. |
|  |  |  |
|  |  |  |

**Question 2-5**: For Scheme 2, is there a possibility of that UE-A does not transmit the inter-UE coordination information even though it detects expected/potential resource conflict(s) on resource(s) indicated by UE-B’s SCI? Please provide rationales for your answer.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | Based on configured UE-A behavior or attributes of UE-A such as RSU, leading truck, it can decide to or not to send the coordination information even though it detects expected/potential conflict. |
|  |  |  |
|  |  |  |

* + 1. **Details on condition(s) to determine inter-UE coordination information**

**Question 2-6**: In Condition 2-A-2, is it necessary to specify further detailed case(s) when UE-A does not expect to perform SL reception from UE-B due to half duplex operation? Please provide rationales for your answer.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | When there is a conflict with UE-A’s own transmission, whether UE-A performs resource reselection or report the conflict to UE-B should be specified. |
|  |  |  |
|  |  |  |

**Question 2-7**: In Scheme 2, do you agree to confirm the following working assumption? Please provide rationales for your answer.

* *Agreement:*
  + *In scheme 2, at least the following is supported to determine inter-UE coordination information:*
    - *Among resource(s) indicated by UE-B’s SCI, UE-A considers that expected/potential resource conflict occurs on the resource(s) satisfying at least one of the following condition(s):* 
      * *Condition 2-A-1:*
        + *Other UE’s reserved resource(s) identified by UE-A are fully/partially overlapping with resource(s) indicated by UE-B’s SCI in time-and-frequency*
        + *FFS: Other details (if any)*
        + *FFS: Whether/how to specify additional criteria and other details (if any) including signaling details of conflict indication*
      * *(Working Assumption) Condition 2-A-2:* 
        + *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation*

*FFS: Other details (if any)*

* + - * *FFS: Other condition(s)*
    - *FFS: Other details (if any)*

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comment** |
| Futurewei | Yes | We agree to confirm this working assumption. |
|  |  |  |
|  |  |  |

* + 1. **Details on timeline for inter-UE coordination information**

**Question 2-8**: In Condition 2-A-1/2-A-2, for inter-UE coordination information transmitted in slot n, please provide your views on whether/how to define time window where UE-A monitors other UE’s SCI to detect expected/potential resource conflict(s) on resource(s) indicated by UE-B’s SCI or identifies resource(s) where it does not expect to perform SL reception from UE-B due to half duplex operation. Please provide rationales for your answer.

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Futurewei | For scheme 2, one or multiple PSFCH resources need to be specified/allocated for UE-A to send coordination information. UE-A can perform sensing by the last PSFCH resource for sending the conflict indicator. UE-A can send in the early allocated PSFCH resource once it detects an conflict. |
|  |  |
|  |  |

* 1. **Signaling granularity of (pre)configuration to enable, disable, or control features of inter-UE coordination information**

**Question 3-1**: What combinations of following features are supported for the signaling granularity of (pre)configuration to enable/disable/control features of inter-UE coordination information?

* Scheme type (scheme 1 or scheme 2)
* Resource set type (preferred set or non-preferred set)
* Triggering type (explicit request-based or a condition-based)

|  |  |  |
| --- | --- | --- |
| **Company** | **Combination(s)** | **Comment** |
| Futurewei | All | Scheme 1 and scheme 2 can be combined in one coordination process, e.g., UE-A detects conflict as in scheme 2. Other than the conflict indication, UE-A can also send the preferred resource and/or nonpreferred resource set to UE-B. UE-A sending Scheme 1 coordination information is based on the condition of detecting an expected/potential conflict. But this may need an explicit request from UE-B.  UE-B can request both the preferred set and non-preferred set sent in one message or different message (e.g., preferred set in SCI and non-preferred set in MAC-CE). |
|  |  |  |
|  |  |  |

* 1. **Follow-up discussion after Tuesday’s GTW (October 12th)**
     1. **Scheme 1**

**Question 4-1**: Do you agree following proposal? If company wants to another mechanism, please directly provide wording to describe it.

**Draft proposal 1**:

* *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*
  + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B. FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.*
    - *Priority value to be used for PSCCH/PSSCH transmission* 
      * *It replaces prio\_TX*
    - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*
      * *It replaces L\_subCH*
    - *Starting/ending time location of resource selection window*
      * *It replaces n+T\_1/n+T\_2*
    - *Resource reservation interval* 
      * *It replaces P\_rsvp\_TX*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Comment** |
| Intel | | Yes, with comments | | *Overall, we are supportive of the proposal.*  *We have the following questions for FL: We noticed that discussion is sub-divided on sub-aspects which is reasonable to keep its scope limited, however we are not clear on overall picture with respect to support of condition- and request- based feedback as well as preferred and non-preferred resource sets for each feedback type. It would be good to decide it first since solutions may be dependent on that point. Is that correct understanding that we working under assumption that all options are to be supported?*  *We propose the following modifications. Our main motivation is to have an option where parameters for generation of request and condition- based feedback are aligned so that we can have unified solutions.*   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B or by system configuration. FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4 and whether dedicated RSRP thresholds can be configured.*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*       * *One sub-channel is assumed if this parameter is not provided by request or system configuration*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*       * *Resource selection window of fixed duration is assumed if this parameter is not provided by request or system configuration*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*       * *Zero resource reservation period is assumed if this parameter is not provided by request or system configuration* |
| Ericsson | | Yes | | We are supportive of this proposal |
| Fraunhofer | | Yes | | We are fine with the proposal. We have suggested some wording change to make the text cleaner.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *~~When the inter-UE coordination information transmission is triggered by UE-B’s explicit request,~~ The candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B. ~~FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.~~*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*   + *FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.* |
| Nokia, NSB | | Yes, with comments | | * + - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*       * *If configured, UE-B provides instead a message size (TBS) and it is up to UE-A to determine the number of sub-channels to be used by UE-B.*   Rationale: If TBS is indicated by UE-B, the required number of sub-channels (L\_subCH) for UE-B’s transmission is determined at UE-A, which may be more optimal as only UE-A can estimate the expected SINR (and therefore MCS) for UE-B’s transmission (assuming UE-A is UE-B’s only intended receiver). |
| Apple | | Yes | | We are fine with this proposal.  Just want to mention that UE-B’s explicit request also needs to indicate the number of resources to be selected (for each TB). This information is needed in UE-A’s resource selection procedure Step 2. |
| CMCC | | Yes with comments | | We are basically fine with the proposal, except that for the 3rd bullet. We think that one of the rationales behind providing the starting/ending time location of resource selection window is that the selection of T1 and T2 is up to UE implementation, and if SL DRX is applied, the resource selection window may further be restricted by that. However, we think that this may not be mandatory, the UE-B can simply inform the remaining PDB and let the UE-A to determine the resource selection window.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B. FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window (optional)*       * *It replaces n+T\_1/n+T\_2*     - *Remaining PDB (optional)*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX* |
| LGE | | Yes with comments | | According to resource (re)selection procedure, it is necessary to address how to set the following parameters:  - the resource pool from which the resources are to be reported;  - L1 priority, ;  - the number of sub-channels to be used for the PSSCH/PSCCH transmission in a slot, ;  - optionally, the resource reservation interval, , in units of msec.  -  -  In our view, it is necessary to include C\_resel as follows:   * + - *Resource reselection counter*       * *It replaces C\_resel*   Otherwise, it is necessary to define how to set this value when UE-A determines the set of resources preferred for UE-B’s transmission after the request reception from UE-B.  In our understanding, the remaining packet delay budget is redundant when UE-A is provided with the end of the resource selection window since the value of T\_2 is upper-bounded by the remaining packet PDB. Moreover, considering that UE-B’s selected resources will be within UE-B’s resource selection window, it is sufficient to provide the information about the resource selection window.  Regarding other parameters which are not specified in resource (re)selection procedure, we do not need to consider them in this proposal. |
| Sharp | | Yes | |  |
| InterDigital | | Yes | |  |
| Spreadtrum | | Yes with comments | | UE-A should know the Tx resource pool used by UE-B. So the parameters should include the transmission resource pool of UE-B.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B. FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*     - *The transmission resource pool of UE-B*       * *It replaces “the resource pool from which the resources are to be reported”* |
| Qualcomm | | Please see comments | | We’re ok with the general direction of the proposal with the changes below. Our evaluation results show that performance can be improved when additional criteria for the selecting the preferred resource set is introduced compared to Rel-16 procedure. Therefore, we propose to remove the text that adopts the Rel-16 procedure unchanged.   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource ~~as specified in Rel-16 TS 38.214 Section 8.1.4~~*   + *When the inter-UE coordination information transmission is triggered by UE-B~~’s explicit request~~, the candidate single-slot resource(s) are determined ~~in the same way according to Rel-16 TS 38.214 Section 8.1.4~~ with at least following parameters provided by signaling from UE-B. ~~FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.~~*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *~~It replaces prio\_TX~~*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *~~It replaces L\_subCH~~*     - *Starting/ending time location of resource selection window*       * *~~It replaces n+T\_1/n+T\_2~~*     - *Resource reservation interval*        * *~~It replaces P\_rsvp\_TX~~* |
| Samsung | |  | | We think that the second bullet is redundant and FFS bullet is a separate issue. We are discussing about information provided by UE-B. So, FFS can be discussed separately. For time location of resource selection window, it is not clear how to realize it. We think that remaining PDB can be signalled for this purpose. Based on above comments, we suggest following modification as   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *~~When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with~~ at least following parameters provided by signaling from UE-B. ~~FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.~~*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *~~Starting/ending time location of resource selection window~~ Remaining PDB*       * *It will decide~~replaces n+T\_1/n+~~T\_2*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX* |
| CATT, GOHIGH | | Yes | | We are fine with this proposal. |
| NEC | | Yes, with comments | | We’re basically fine with the proposals.  Regarding other parameters in TS 38.214 8.1.4, we tend to agree that the TX resource pool from which UE B selects resource should be included.  As to resource selection window determination, we think either the start and end time of selection window of UE-B or the remaining packet delay budget works. Given that, we propose:  **Draft proposal 1**:   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a set of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B.*      - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *Starting/ending time location of resource selection window*       * *It replaces n+T\_1/n+T\_2*       * *FFS alternatively using the remaining packet delay budget of UE-B*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*     - *Index of transmission resource pool of UE-B*       * *It replaces the resource pool from which the resources are to be reported*   + *FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.* |
| NTT DOCOMO | | Yes with comment | | As commented before, this determination of preferred resources does not consider Condition 1-A-2 anymore. When the condition is additionally agreed, this determination mechanism should be updated accordingly. To clarity this, we suggest to add one FFS as follows.   * + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by signaling from UE-B. FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4. FFS how to exclude resources based on Condition 1-A-2, if supported.* |
| Vivo | | Comment | | * The starting time of the selection window should be determined by UE-A, based on the timing when receiving the request signaling and UE-A’s processing time to decode the request signaling and processing time to prepare the resource selection. Since UE-B is not aware of UE-A’s exact processing time, it is for UE-A to decide the n+T1. T2 is determined by UE-A as well which has dependence with T1. Therefore, it is more straightforward to inform remaining PDB as current spec. * Number of retransmissions can be informed to UE-A as well, which assists UE-A to decide the resources included in coordination information. * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by UE-B’s explicit request*     - *Priority value to be used for PSCCH/PSSCH transmission*        * *It replaces prio\_TX*     - *Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot*       * *It replaces L\_subCH*     - *~~Starting/ending time location of resource selection window~~*       * *~~It replaces n+T\_1/n+T\_2~~*     - *Remaining PDB*     - *Resource reservation interval*        * *It replaces P\_rsvp\_TX*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the preferred resources included in coordination information is decided according to following parameters provided by UE-B’s explicit request*     - *Number of retransmission resources* |
| OPPO | Comments | | As commented in the previous round, in addition to the parameters in the list UE-A has to know the transmission resource pool used by UE-B, in current specification there is no mechanism to guarantee that transmission resource used by transmitter and receiver are same. Without this information, UE-A cannot determine the sensing window, resource selection window, sub-channel size, etc. correctly.   * + - *Transmission resource pool of UE-B*        * *It replaces the resource pool from which the resources are to be reported* | |
| Huawei, HiSilicon | See comments | | The current proposal focuses on request based procedure, i.e., UE-B sends explicit request to UE-A. Therefore, “signalling from UE-B” can be replaced by “UE-B’s explicit request” to be clearer. Otherwise, the exact meaning of “signalling from UE-B” is unclear.  We suggest to remove the FFS part. Reusing R16 procedure works well, the benefits of the FFS point is unclear.  In summary, we suggest the following changes in red:  ==   * *For Condition 1-A-1 of Scheme 1, the set of resources preferred for UE-B’s transmission is a form of candidate single-slot resource as specified in Rel-16 TS 38.214 Section 8.1.4*   + *When the inter-UE coordination information transmission is triggered by UE-B’s explicit request, the candidate single-slot resource(s) are determined in the same way according to Rel-16 TS 38.214 Section 8.1.4 with at least following parameters provided by ~~signaling from UE-B~~ UE-B’s explicit request. ~~FFS whether or not to apply RSRP threshold increase in Step 7) of Rel-16 TS 38.214 Section 8.1.4.~~*   + *…* | |
| Fujitsu | Comments | | Firstly, we’d like to add the following parameter. In our contribution R1-2109037 Section 2.4.1, we have simulated that PRR improvement is improved by adjusting X at UE-A.   * + - *The portion of candidate single-slot resources over the total resources*        * *It replaces X*   Secondly, we also simulated in R1-2109037 Section 2.4.1 that using a new metric such as SINR at UE-A side can achieve better PRR performance. Besides the metric of RSRP, we propose to also consider other metrics. | |
| Sony | Yes | | We are supportive with this proposal. | |
| Panasonic | Yes | | We are fine with proposal. | |

**Question 4-2**: Do you agree following proposal? If company wants to another mechanism, please directly provide wording to describe it. Companies also provide which option(s) are preferred.

**Draft proposal 2**:

* *For Option A of Scheme 1, if UE-B receives the set of preferred resource(s) determined by Condition 1-A-1,* 
  + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold,* 
    - *Physical layer at UE-B reports the intersection set instead S\_A to higher layer for its resource (re-)selection.*
  + *Otherwise, down-select one of followings:* 
    - *Option 1: Physical layer at UE-B reports S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer for its resource (re-)selection.*
    - *Option 2: Physical layer at UE-B reports both the intersection set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer for its resource (re-)selection.*
    - *Option 3: After physical layer at UE-B replenishes the intersection set till its size meets threshold by randomly adding remaining resources from S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.*
    - *Option 4: Physical layer at UE-B reports the preferred resource set instead S\_A to higher layer for its resource (re-)selection.*
    - *Option 5: Physical layer at UE-B includes replenishes the intersection set by adding preferred resources that have been excluded in Step 5) of Rel-16 TS 38.214 Section 8.1.4. If the size of the updated intersection set is larger than or equal to a threshold, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection. Otherwise, physical layer at UE-B replenishes the intersection set by UE-B’s implementation to have its size larger than the threshold instead, and it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.*
  + *FFS: Value/definition of the threshold*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Option(s)** | | **Comment** |
| *Intel* | | *Yes* | | *Option 2 and Option 3* | | *Our preference is Option 3. We suggest considering further options 2 and 3 only.* |
| Ericsson | | Yes | | Option 3 | | We are supportive of the main bullet when the intersection of the resources is larger or equal than a threshold. Moreover, for the down-selection among the different options, we are supportive of Option 3. In our view, it is the most aligned one with the behavior in the first sub-bullet. |
| Fraunhofer | | Yes | | Option 3 and Option 4 | | We support Option 3 where UE-B uses the intersection set plus random remaining resources from the candidate resource set to ensure that the updated set is larger or equal to the threshold.  We support Option 4 for the case where UE-B has a very small or no candidate resource set due to limited sensing/power saving. It can then report the preferred resource set to the higher layers. |
| Nokia, NSB | | No | |  | | * + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and UE-B’s sensing result ~~S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4~~ is larger than or equal to a threshold,*      - *Physical layer at UE-B reports the intersection set instead S\_A to higher layer for its resource (re-)selection.*     - *FFS how UE-B determines its sensing result, including enhancements of Rel-16 exclusion procedure*   UE-B performing Step 7 (i.e., increasing the RSRP threshold by 3dB to keep at least X% of candidates) makes no sense (and will unnecessarily harm UEs around UE-B by effectively reducing the range of protection).  For example, if M\_total=1000 and X=10%, UE-B would keep increasing its RSRP threshold until set S\_A has at least 100 resources, even though the intersection with UE-A’s preferred resource set may have been sufficiently large without increasing UE-B’s RSRP threshold even once. As a result, the degree of protection afforded to UEs around UE-B may decrease unnecessarily. |
| Apple | | Yes | | Option 2 or Option 3 | | For Option 2, MAC layer may have the similar procedure as described in Option 3. |
| CMCC | | Yes | | Option 5 with modifications | | In Option 5, it only includes the case of unmonitored slots in Step 5). We believe that both Step 5) and Step 6) should be considered, since in case of exposed node issue, some resource may be over-excluded when performing Step 6). These resources should be added back, if they are indicated as the preferred set of resources.   * + - *Option 5: Physical layer at UE-B includes replenishes the intersection set by adding preferred resources that have been excluded in Step 5) and Step 6) of Rel-16 TS 38.214 Section 8.1.4. If the size of the updated intersection set is larger than or equal to a threshold, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection. Otherwise, physical layer at UE-B replenishes the intersection set by UE-B’s implementation to have its size larger than the threshold instead, and it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.* |
| LGE | | Yes with comments | | 1, 2 | | According to the agreement made in RAN1#106 E-meeting as following, there is no case where UE-B uses in its resource (re-)selection, resource(s) belonging to the preferred resource set only. In this point of view, Option 4 seems not necessary.   * + - * *Option A): UE-B’s resource(s) to be used for its transmission resource (re-)selection is based on both UE-B’s sensing result (if available) and the received coordination information*         + *UE-B uses in its resource (re-)selection, resource(s) belonging to the preferred resource set in combination with its own sensing result*   *UE-B uses in its resource (re-)selection, resource(s) not belonging to the preferred resource set when condition(s) are met*  *FFS: Details of condition(s)*  *This option is supported when UE-B performs sensing/resource exclusion*  *FFS: Other details (if any)*  In option 2, it is understood that once physical layer at UE-B reports both the intersection set and S\_A to higher layer, the higher layer will prioritize the resources belonging to the intersection set when it decides selected grant or selected resources. In this case, even though the size of the intersection set is small, it would be possible that the size is sufficient to decide the selected resources in higher layers. Moreover, if Condition 1-A-2 is supported, option 2 would be beneficial. In this case, when the size of the intersection set is not sufficient, higher layer at UE-B could select resources FDMed with the preferred resource set first, since it would be expected that UE-A can perform SL reception from UE-A.  Regarding Nokia’s comment, it seems a separate issue which is that whether some step(s) of Rel-16 Mode 2 RA are skipped or not. If majority companies are fine, we are open to following FFS under the main bullet.   * + *FFS: Whether or not to skip step(s) (e.g. Step 5), Step 7)) of Rel-16 Mode 2 RA when UE-B performs Option A or not.* |
| Sharp | | Yes | | Option 3 | |  |
| InterDigital | | Yes | | Option 2 | | We think Option 2 is simple and sufficient. With the two sets, MAC can apply a resource selection with higher probability to select a resource within the intersection, i.e., prioritize the resources.  The threshold can be based on priority of the TB, i.e., the one indicated to UE-A. |
| Spreadtrum | | Yes | | Option 3 | |  |
| Qualcomm | | No | |  | | To the best of knowledge, there hasn’t been any evaluation results for the proposed scheme. Our, and other companies’, evaluation results show that combining sensing results with the preferred resource set does provide performance as good as using only the preferred resource set and could even degrade performance relative to Rel-16. |
| Samsung | |  | | Option 5 with modifications | | We prefer Option 5.  At first, we are still discussing about other conditions on the top of 1-A-1, so it would be better to remove condition 1-A-1. Also, it would be better to make clear that the UE behaviour is possible when UE-B has available sensing results. In the first sub-bullet, UE can receive data from more than one UE. Also, in Option 5, UE’s implementation can be modifity to randomly adding resources back from S\_A  Based on above comments, we suggest following modification as   * *For Option A of Scheme 1, if UE-B receives the set of preferred resource(s) ~~determined by Condition 1-A-1~~ and if UE-B’s sensing result is available*   + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set(s) and candidate resource set S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold,*      - *Physical layer at UE-B reports the intersection set instead S\_A to higher layer for its resource (re-)selection.*   + *Otherwise, down-select one of followings:*      - *Option 5: Physical layer at UE-B includes replenishes the intersection set by adding preferred resources that have been excluded in Step 5) of Rel-16 TS 38.214 Section 8.1.4. If the size of the updated intersection set is larger than or equal to a threshold, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection. Otherwise, physical layer at UE-B replenishes the intersection set by ~~UE-B’s implementation~~ randomly adding remaining resources from S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to have its size larger than the threshold instead, and it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.*   *FFS: Value/definition of the threshold* |
| CATT, GOHIGH | | No | |  | | We don’t agree this proposal.  If UE-B performs resource exclusion without considering the preferred resource set, UE-B may select the resource(s) which is undesirable for UE-A’s reception. So we prefer to consider the preferred resource set immediately after step 4), with this operation, the preferred resource set will be used with more efficiency.  Additionally, from our simulation results, it can find clear performance gain, if the preferred resource set is considered in the resource exclusion procedure. The simulation results are provided as following:   * Option 1: Final available resource set is the intersection of preferred resource set and UE-B’s available resource set * Option 2: The preferred resource set is treated as UE-B’s initial candidate resource set     The proposal is changed as following:   * *For Option A of Scheme 1, if UE-B receives the set of preferred resource(s) ~~determined by Condition 1-A-1~~,*    + *S\_A is initialized as the intersection set between the preferred resource set and candidate single slot resources in step 4) of Rel-16 TS 38.214 Section 8.1.4.*   + *The other steps of Rel-16 TS 38.214 Section 8.1.4 can be directly reused.*      - *FFS: Value/definition of the threshold X*   + *~~If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold,~~*      - *~~Physical layer at UE-B reports the intersection set instead S\_A to higher layer for its resource (re-)selection.~~*   + *~~Otherwise, down-select one of followings:~~*      - *~~Option 1: Physical layer at UE-B reports S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer for its resource (re-)selection.~~*     - *~~Option 2: Physical layer at UE-B reports both the intersection set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer for its resource (re-)selection.~~*     - *~~Option 3: After physical layer at UE-B replenishes the intersection set till its size meets threshold by randomly adding remaining resources from S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.~~*     - *~~Option 4: Physical layer at UE-B reports the preferred resource set instead S\_A to higher layer for its resource (re-)selection.~~*     - *~~Option 5: Physical layer at UE-B includes replenishes the intersection set by adding preferred resources that have been excluded in Step 5) of Rel-16 TS 38.214 Section 8.1.4. If the size of the updated intersection set is larger than or equal to a threshold, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection. Otherwise, physical layer at UE-B replenishes the intersection set by UE-B’s implementation to have its size larger than the threshold instead, and it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.~~*     - *~~Option 6: up to UE implementation to report preferred resource set, or~~*   + *~~FFS: Value/definition of the threshold~~* |
| NEC | | Yes | | Option 2A  Option 2 | | We are fine with option 2 with modification because intersection set and S\_A set has overlapped part which is redundantly reported in current option 2.  **Draft proposal 2**:   * *For Option A of Scheme 1, if UE-B receives the set of preferred resource(s) determined by Condition 1-A-1,*    + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to a threshold,*      - *Physical layer at UE-B reports the intersection set instead S\_A to higher layer for its resource (re-)selection.*   + *Otherwise, down-select one of followings:*      - *Option 1: Physical layer at UE-B reports S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer for its resource (re-)selection.*     - *Option 2: Physical layer at UE-B reports both the intersection set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer for its resource (re-)selection.*     - *Option 2A: Physical layer at UE-B reports both the intersection set and the remaining S\_A excluding the intersection set to higher layer for its resource (re-)selection.*     - *Option 3: After physical layer at UE-B replenishes the intersection set till its size meets threshold by randomly adding remaining resources from S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.*     - *Option 4: Physical layer at UE-B reports the preferred resource set instead S\_A to higher layer for its resource (re-)selection.*     - *Option 5: Physical layer at UE-B includes replenishes the intersection set by adding preferred resources that have been excluded in Step 5) of Rel-16 TS 38.214 Section 8.1.4. If the size of the updated intersection set is larger than or equal to a threshold, it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection. Otherwise, physical layer at UE-B replenishes the intersection set by UE-B’s implementation to have its size larger than the threshold instead, and it reports the updated intersection set instead S\_A to higher layer for its resource (re-)selection.*   + *FFS: Value/definition of the threshold* |
| NTT DOCOMO | | Yes | | 1, 2 | | Option 1 seems simple enough.  Option 2 can achieve better performance since MAC layer can select from the intersection preferentially, while UE implementation might be more complicated.  We think Option3-like random behaviour should be performed at MAC layer. Option 4 means that UE-B might use non-preferred resources from UE-B perspective, which leads to large interference to surrounding UEs. Option 5 is complicated behaviour. We do not see the necessity compared to other options. |
| vivo | |  | | Option 1 or option 2 | | We do not support the 1st sub-bullet, the benefit is not well justified.  For the 2nd sub-bullet, we support option 1 or option 2, depends on whether MAC CE or 2nd  SCI is used to convey the coordination info. We assume MAC layer will select resource based on the intersection and other resource in S\_A |
| OPPO | NO | |  | | We suggest to avoid the down-selection among the 5 options, according to the agreement made in the last meeting, seems Option A) does not necessarily impact PHY layer, as the resource (re-)selection is performed at MAC layer actually. Given that some option (such as Option 2) above can already impact MAC layer behaviour, it looks much simpler if PHY just report the preferred resource set and S\_A to MAC layer, and up to MAC layer to (re-)select resources based on the 2 sets.   * *For Option A of Scheme 1, if UE-B receives the set of preferred resource(s) determined by Condition 1-A-1,*    + *UE-B reports the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 to higher layer* | |
| Huawei, HiSilicon | No | | Seem comment | | Comment#1: According to current MAC spec, MAC layer will select the number of HARQ retransmissions for the current TB. So the number of resources that UE-B needs may be time varying. It’s inaccurate to configure a fixed threshold. Using “UE-B’s requirement as per MAC specification” is more accurate.   |  | | --- | | …(copied from TS 38.321)…  5.22.1 SL-SCH Data transmission  …  …  3> select the number of HARQ retransmissions from the allowed numbers that are configured by RRC in *sl-MaxTxTransNumPSSCH* included in *sl-PSSCH-TxConfigList* and, if configured by RRC, overlapped in *sl-MaxTxTransNumPSSCH* indicated in *sl-CBR-PriorityTxConfigList* for the highest priority of the logical channel(s) allowed on the carrier and the CBR measured by lower layers according to clause 5.1.27 of TS 38.215 [24] if CBR measurement results are available or the corresponding *sl-defaultTxConfigIndex* configured by RRC if CBR measurement results are not available;  … |   Comment#2: since UE-A already gives preferred resources to UE-B, UE-B should use resources belonging to the intersection as first priority. If they are not enough, UE-B can uses resources belonging to S\_A.  In summary, we suggest the following changes in red:  ==   * *For Option A of Scheme 1, if UE-B receives the set of preferred resource(s) determined by Condition 1-A-1,*    + *If the number of candidate single-slot resources belonging to the intersection between the preferred resource set and S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 is larger than or equal to ~~a threshold~~ UE-B’s requirement as per MAC specification, UE-B uses candidate single-slot resource(s) belonging to the intersection in its resource (re-)selection*     - *~~Physical layer at UE-B reports the intersection set instead S\_A to higher layer for its resource (re-)selection.~~*   + *Otherwise~~, down-select one of followings:~~*      - *…(remove option 1-5)…*     - *UE-B first uses candidate single-slot resource(s) belonging to the intersection set, and then further uses S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 outside the intersection in its resource (re-)selection if necessary.*   + *~~FFS: Value/definition of the threshold~~* | |
| Fujitsu | Yes | | Option 5 | | We support Option 5 where the preferred resources related to un-monitored slots at UE-B side will be firstly replenished. This type of preferred resources can provide sensing information which is missing at UE-B due to un-monitored slots. | |
| Panasonic | Yes | | Option 2 or Option 3 | |  | |

**Question 4-3**: Which of following condition(s) are supported? If company wants to another mechanism, please directly provide wording to describe it. Note that the wording of “UE-A does not expect to perform SL reception” is used with consideration for a possibility that UE-A does not know in advance information on whether or not it can actually perform SL reception on overlapping reserved resources for its TX and RX.

* *For Scheme 1 with preferred resource set,*
  + *Condition 1-A-2:*
    - *Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*
* *For Scheme 1 with non-preferred resource set, support following condition:*
  + *Condition 1-B-2:*
    - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*
  + *Condition 1-B-3:*
    - *Resource(s) (e.g., slot(s)) where UE-A selected for its own SL transmission(s)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | | **Condition(s)** | | **Comment** |
| *Intel* | | *Condition  1-B-2 only* | | *We propose the following modifications. Condition 1-A-2 duplicates Condition 1-B-2 and hides part of the information from TX UE selecting resources. Condition 1-B-3 may not be necessary depending on design option. Therefore, we propose the following changes:*   * *~~For Scheme 1 with preferred resource set,~~*   + *~~Condition 1-A-2:~~*     - *~~Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B~~* * *For Scheme 1 with non-preferred resource set, support following condition:*   + *Condition 1-B-2:*     - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*     - *Resources under Condition 1-B-2 are separately indicated*   + *~~Condition 1-B-3:~~*     - *~~Resource(s) (e.g., slot(s)) where UE-A selected for its own SL transmission(s)~~* |
| Ericsson | | See comment | | For this proposal, we would like to get more clarification on the actual intention of “expect to perform SL reception from UE-B”. Is it due to UE-A’s/UE-B’s SL-DRX or due to its own transmission or any other restriction? |
| Fraunhofer | | See comments | | We are a bit confused by the explanation of “UE-A does not expect to perform SL reception” from the FL. Our understanding is that one of the reasons why UE‑A is expected to not perform SL reception on a resource is due to the half-duplex issue, where UE-A has already scheduled its own transmission on the same resource/time slot.  If our understanding is correct, we support Condition 1-A-2 and Condition 1-B-2, with the assumption that 1-B-3 is already included in 1-B-2.  Else, we would support Condition 1-B-3 and like to introduce a Condition 1-A-3 similar to 1-B-3:   * + *Condition 1-A-3:*   *Resource(s) excluding slot(s) which UE-A has selected for its own SL transmission(s)* |
| Nokia, NSB | | 1-A-2  1-B-2 | | Condition 1-B-3 looks like a special case of Condition 1-B-2 |
| Apple | | At least 1-B-2. Fine to add 1-A-2 as well | | In determining the set of non-preferred resources, UE-A’s own scheduled SL/UL transmission needs to be considered to avoid half duplex issue. The half-duplex issue on PSFCH should also be considered. |
| CMCC | | Condition 1-B-3 | | For the 1st main bullet, when UE-A does not expect to perform SL reception from UE-B, the corresponding resources belongs to the non-preferred resource sets for UE-B’s transmission, not the preferred resource sets.  For the 2nd main bullet, we prefer Condition 1-B-3. First, as some companies pointed out, the wording “does not expect to perform SL reception” is not clear. Second, we don’t think that UE-A should be limited as the intended receiver of UE-B. |
| LGE | | 1-B-2 | | It seems that both Condition 1-A-2 and Condition 1-B-2 handle the half duplex problem. We thinks that supporting one of them is sufficient. We prefer to support Condition 1-B-2.  If UE-A is a destination UE of a TB transmitted by UE-B, condition 1-A-2, 1-B-2 are useful to avoid unnecessary transmissions from UE-B to UE-A.  In our view, there would be many cases when UE-A cannot perform SL reception, further restriction or limitation seems not necessary.  Regarding Condition 1-B-3, UE-A may need to postpone its initial transmission to generate and transmit its own SL transmission(s) to UE-B before indicating them. In other words, time difference between UE-A’s resource (re)selection triggering slot and time location of its initial selected resource needs to cover all the processing time related to generation of inter-UE coordination information, transmission/reception of inter-UE coordination information, resource (re)selection with consideration for the inter-UE coordination information. It may require to modify Rel-16 Mode 2 RA resource (re)selection procedure to postpone initial transmission after resource (re)selection procedure. Or, it may require some restriction when condition 1-B-3 can be used. For instance, the time gap between resource triggering and time location of initial selected resource is larger than a threshold. |
| Sharp | | 1-B-2 | |  |
| InterDigital | | 1-A-2  1-B-2 | | Condition 1-B-3 in our view is due to the half-duplex issues, i.e., UE-A is not able to perform SL reception from any UE (including UE-B) due to a scheduled UL or SL transmission. Therefore, we consider Condition 1-B-3 is covered by Condition 1-B-2. |
| Spreadtrum | | *Condition*  *1-A-2 and1-B-2* | |  |
| Qualcomm | | Condition 1-B-3 | | It’s not clear why the three options are being jointly discussed.  However, our evaluation results show that 1-B-3 (indicating the initial transmission only) provides significant performance gains. 1-B-2, when applied to avoid half-duplex doesn’t significantly improve performance as shown in our contribution.   * *~~For Scheme 1 with preferred resource set,~~*   + *~~Condition 1-A-2:~~*     - *~~Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B~~* * *For Scheme 1 with non-preferred resource set, support following condition:*   + *~~Condition 1-B-2:~~*     - *~~Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B~~*   + *Condition 1-B-3:*     - *Resource(s) ~~(e.g., slot(s))~~ where UE-A selected for its own SL transmission(s)*       * *FFS which transmissions, e.g. initial and/or retransmission.* |
| Samsung | |  | | For explicit trigger based, we support the following conditions   * *For Scheme 1 with preferred resource set,*   + *Condition 1-A-2:*     - *Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation* * *For Scheme 1 with non-preferred resource set, support following condition:*   + *Condition 1-B-2:*     - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation* |
| CATT, GOHIGH | | 1-A-2  1-B-2 | | From our understanding, “does not expect to perform SL reception from UE-B” includes two types of resources:   * UE-A’s transmission slot due to half-duplex   UE-A need to receive other UE’s transmission with higher priority. |
| NEC | | All | |  |
| NTT DOCOMO | | 1-A-2  1-B-2 | | Half-duplex issue should be addressed sufficiently. Without 1-A-2, UE-A might include unreceivable slots in preferred resource set. Without 1-B-2, UE-B has room to select slots where UE-A cannot receive.  Regarding 1-B-3, this is included in 1-B-2. |
| vivo | | 1-A-2  1-B-2 | | Condition 1-B-3 looks like a special case of Condition 1-B-2 |
| OPPO | 1-A-2  1-B-2 with revisions | | We suggest the follow change to 1-A-2 and 1-B-2, otherwise we do not think the wording is clear. Note that “*due to half duplex operation*” has already been used in the agreement made last meeting.  1-B-3 is covered by modified 1-b-2.   * *For Scheme 1 with preferred resource set,*   + *Condition 1-A-2:*     - *Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation* * *For Scheme 1 with non-preferred resource set, support following condition:*   + *Condition 1-B-2:*     - *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation* | |
| Huawei, HiSilicon | 1-A-2, 1-B-2 | | Given the heavy workload and limited time, no need to consider new conditions like 1-B-3. | |
| Fujitsu | 1-A-2  1-B-2  1-B-3 | | In our view, the difference between 1-B-2 and 1-B-3 is that 1-B-3 does not require UE-A to be the intended receiver of UE-B. In that case, we also support 1-B-3. | |
| Sony | 1-A-2 and 1-B-2 | |  | |
| Panasonic | 1-A-2  1-B-2 | | 1-A-2 and 1-B-2 are useful to avoid half duplex issue. | |

**Question 4-4**: Do you agree following proposal? If company wants to another mechanism, please directly provide wording to describe it. Companies also provide which option(s) are preferred.

**Draft proposal 4**:

* *For Condition 1-B-1 of Scheme 1, down-select one or more of followings during RAN1#106bis-e meeting:*
  + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE*
  + *Option 2: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE when UE-A is a destination of a TB transmitted by the UE*
  + *Option 3: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is outside of (pre)configured RSRP range [RSRPmin RSRPmax], where RSRPmin and RSRPmax are determined by at least priority value*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Company** | | **Yes or no** | | **Option(s)** | | **Comment** |
| Intel | | Yes | | Option 3 | | Our preference is Option 3  We can also accept both Option 1 and Option 2 if separate RSRP thresholds can be pre-configured |
| Ericsson | | See comment | | Combination of options | | For this proposal, we propose to combine the different options in order to facilitate TX UE behaviour. |
| Fraunhofer | | Yes | | Option 1 or Option 3 | | We support Option 1, and can accept Option 3 based on the explanation given by QC in the GTW today. We are not sure about how Option 2 would work. |
| Nokia, NSB | | Yes | | Option 1  Option 2 | |  |
| Apple | | Yes | | Option 1 | |  |
| CMCC | | Yes | | Option 1 | | We prefer Option 1.  Regarding Option 3, we don’t think it technically correct. We believe that Option 3 is more like a combination of Option 1 and Option 2. The case when the reserved resources of a UE-C whose RSRP is smaller than a (pre-)configured threshold is determined as non-preferred resource sets for UE-B’s transmission works for the case when UE-A is the destination of UE-C. However, in option 3, it only defines a lower bound threshold, and when the reserved resources are from a random UE, those with RSRP measurements are not the non-preferred resource sets. |
| LGE | | Yes | | 1 | | According to the agreement made in RAN1#106 E-meeting as following, both priority value indicated by other UEs’ SCI and RSRP measurement should be used for UE-A to identify the non-preferred resource set.   * + - * *Condition 1-B-1:*         + *Reserved resource(s) of other UE identified by UE-A from other UEs’ SCI (including priority field) and RSRP measurement*   *FFS: Other details (if any)*  On option 1, especially when UE-A is a destination UE of a TB transmitted by UE-B, it is important to avoid high interference resources as in preferred resource set (Condition 1-A-1).  For progress, we can accept the combinations of Options with some modification as follows:   * + *When UE-A is a destination of a TB transmitted by other UE,*     - *Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is outside of (pre)configured RSRP range [RSRPmin RSRPmax], where RSRPmin and RSRPmax are determined by at least priority value*   + *Otherwise,*     - *Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE*   Even though it is supported that the non-preferred resource set is used to protect UE-A’s reception, these resource could be high interferer to UE-B’s transmission. |
| Sharp | | Yes | | Option 1 | |  |
| InterDigital | | Yes | | Option 1 | | In our view, Option 1 is about sensing mechanism (section 8.1.3 TS 38.214) and any resource with high interference at UE-A (thus excluded in the sensing as specified) should be included in non-preferred resource set.  We are not clear about the scenario applicable to Option 2. If UE-A has previously received a resource reservation from another UE, which is intended for UE-A and reserves a resource in the future, UE-A should consider this previously-reserved resource as non-preferred in the resource set to UE-B regardless if this resource is within the RSW indicated by UE-B. We think this resource meets Condition 1-B-2 discussed above, i.e., “*Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-*B” because UE-A, as an intended RX UE for another UE, expects to receive from that UE in the resource according to a previously received resource reservation. |
| Spreadtrum | | Yes | | Option 1 | |  |
| Qualcomm | | No, please see comments. | | Option 2 | | Our preference is Option 2 since our results show that it provides performance gains compared to Option 1. The intention of Option 2 is for UE-A to protect transmissions it intends to receive from interference by UE-B. Reservations received with large RSRP are likely to also be sensed by UE-B and don’t need to be indicated as non-preferred resources. Unlike reservations received with small RSRP that would be missed by UE-B. An added benefit of this option is that it results in a small non-preferred resource set, reducing the size and improving the reliability of the coordination message itself.   * *For Condition 1-B-1 of Scheme 1, down-select one or more of followings during RAN1#106bis-e meeting:*   + *Option 1: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE*   + *Option 2: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is smaller than a (pre)configured RSRP threshold which is determined by at least priority value indicated by SCI of the UE when UE-A is a destination of a TB transmitted by the UE*   + *~~Option 3: Reserved resource(s) of other UE identified by UE-A whose RSRP measurement is outside of (pre)configured RSRP range [RSRPmin RSRPmax], where RSRPmin and RSRPmax are determined by at least priority value~~* |
| Samsung | |  | | Option 1 | | We prefer Option 1. But the wording is a bit unclear and can lead to misunderstanding. It is not clear which UE the proposal is referring to in: “*at least priority value indicated by SCI of the UE*”. Is this “the other UE”?  Maybe we can say:   * + *Option 1: Reserved resource(s) of other UE(s) identified by UE-A whose RSRP measurement is larger than a RSRP threshold which is determined by at least priority value indicated by SCI of the other UE(s)* |
| CATT, GOHIGH | | Yes | | Option 1 | | Option 2 is somehow related to condition 1-B-2. It could be discussed after condition 1-B-2 is clear. |
| NEC | | Yes | | Option 1 | |  |
| NTT DOCOMO | | Yes | | 1 or 3 | | In our understanding, Option 3’s intention is that if RSRP is quite large, this reservation is transmitted from quite near UE from UE-A. in this case UE-B as well as UE-A can receive the reservation. So no coordination message for this reservation should be OK.  We can understand this motivation, so option 3 is fine for us.  But Option 1 is simpler, so we slightly prefer option 1. |
| vivo | | Yes | |  | | Option 1 and option 2/3 are treating different scenarios.  If UE-A is intended receiver of UE-B, option 1 can be used to compensate UE-B’s sensing result. This solution is similar as scheme 1 preferred resource.  If UE-A is any transmitter that relays the resource reservation of UE-B, option 2 is more proper, but additional restriction should be added to option 2. UE-A only forward resource of few UE-B, otherwise, spatial reuse distance of the whole system will be impacted negatively. |
| OPPO | Yes | | Option 1 | | Support Option 1, according to the working assumption of last meeting, in Scheme 1 UE-A is destination of UE-B. If UE-A is destination of more than one UEs and they are conflicting in future, UE-A should determine UE-B (i.e. which UE to receive) from them first, and regard others as interferers. | |
| Huawei, HiSilicon | Only option 1 | | Option 1 | | Since this proposal relates to Scheme 1 non-preferred, the intention of Condition 1-B-1 is to find out resources with high interference, i.e., RSRP measurement is larger than a (pre)configured RSRP threshold. So Option 1 is straightforward.  We are unclear about the intention of Option 2 in the context of non-preferred resources. Option 3 includes the appropriate operation of option 1, but also the not appropriate operation of option 2, and hence is also not appropriate. | |
| Fujitsu | Yes | | Option 1  Option 2 | | Supporting both Option 1 and Option 2 seems to be equivalent to supporting Option 3. | |
| Sony | Yes | | Option 1 | |  | |
| Panasonic | Yes | | Option 1 | | The resource with high interference at UE-A is included in non-preferred resource set. | |

**Question 4-5**: Do you agree following proposal? If company wants to another mechanism, please directly provide wording to describe it. Companies also provide which option(s) are preferred.

**Draft proposal 5**:

* *For Scheme 1 with non-preferred resource set, down-select one of followings during RAN1#106bis-e meeting:* 
  + *Option 1: Physical layer at UE-B excludes candidate single-slot resource(s) overlapping with the non-preferred resource set from S\_A obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4. It reports the updated S\_A to higher layer for its resource (re)selection.*
  + *Option 2: Physical layer at UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 6) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*
  + *Option 3: Physical layer at UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 4) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*
  + *FFS: whether/how to handle the case when the number of single-slot resource(s) non-overlapping non-preferred resource set is smaller than a threshold.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes or no** | **Option(s)** | **Comment** |
| *Intel* | *Yes* | *Option 1 with modifications* | *In our view discussion may depends on condition 1-B-1 and 1-B-2 used for feedback generation. For resources under 1-B-2, we can go with Option 1 for selected cast types and destination UEs. For resources under 1-B-1, we suggest modified Option 1:*   * + *Option 1: UE-B ~~excludes~~ in its resource (re-)selection finds difference of candidate single-slot resource(s) obtained after Step 7) of Rel-16 TS 38.214 Section 8.1.4 and ~~overlapping with~~ the non-preferred resource set forming set S\_AF*     - *If size of the set S\_AF exceeds or equal to the pre-configured threshold UE selects resources from set S\_AF*     - *Otherwise set S\_AF is replenished by randomly selected resources from set S\_A* |
| Ericsson | Yes | Option 2 |  |
| Fraunhofer | Yes | Option 2 or Option 3 | We prefer that UE-B excludes overlapping resources before Step 7) when UE-B compares the new candidate resource set size with *X.Mtotal*. |
| Nokia, NSB | No |  | The extent of overlap (i.e., number/fraction of overlapping subchannels) should be considered before excluding. For example, if a 10-subchannel candidate resource overlaps with a 10-subchannel non-preferred resource by just 1 subchannel, it may not be necessary to exclude the candidate resource (especially if UE-B’s RSRP threshold has already been increased too much). |
| Apple | Yes | Option 1 or Option 2 |  |
| CMCC | See comments |  | In our views, the resource exclusion behaviour basically depends on the container of the inter-UE coordination information, and how the non-preferred resource set is informed to the UE-B. We think that we can first make the agreement on the format of inter-UE coordination information and the container, and then decide this proposal.  In addition, we share similar views as QC that Option 3 should be on the table. |
| LGE | Yes | 1 | In case of Option 2 and 3, it will cause RSRP threshold boosting due to the non-preferred resource set. When we compare it with Rel-16 mode 2 RA, these options will make UE-B using higher interference resources for its own transmission. It will affect to Rel-16 UE in the same resource pool.  If we consider the possibility that all or a subset of the non-preferred resources could be skipped by UE-B in its resource (re)selection, we are open to support option 2 or 3 as well. |
| Sharp | Yes | Option 2 |  |
| InterDigital | Yes | Option 2 | We think X% should be still maintained, which is not ensured by Option 1. Option 3 however has the risk that the excluded non-preferred resources are initialized back to Set A as described below in Step 5a) “*If the number of candidate single-slot resources remaining in the set is smaller than , the set is initialized to the set of all the candidate single-slot resources as in step 4.”.* |
| Spreadtrum | Yes | Option 1 or option 2 |  |
| Qualcomm | Yes | Option 3 | The earlier UE-B excludes resources from SA, the higher the likelihood that the final candidate set contains a large number of resources. If Option 1 or 2 are used, then there’s a probability that candidate set is largely composed of non-preferred resource and removing those would lead to a small (or even empty) set.  One additional thing to note is that M\_total should be updated to reflect the size of SA after Step 4). Otherwise, the proportion of available resources in Step 7) would be undervalued.   * + *Option 3: Physical layer at UE-B excludes in its resource (re-)selection, candidate single-slot resource(s) obtained after Step 4) of Rel-16 TS 38.214 Section 8.1.4 overlapping with the non-preferred resource set*     - *M\_total is updated so that it is the size of SA after Step 4)* |
| Samsung |  | option 2 | We slightly prefer Option 2. |
| CATT, GOHIGH | Yes | Option 3 | We prefer option 3, the non-preferred resource set should be avoided at the beginning of resource exclusion procedure. |
| NEC | Yes | Option 1 or 3 | We think the non-preferred resource could be excluded both before sensing excluding or after sensing excluding. |
| NTT DOCOMO | Yes | 1 (but MAC layer) or 3 | In option 1, we think the coordination message is higher layer signalling, so exclusion at MAC layer would be better than at PHY layer.  Between option 1 and option 3, there is a trade-off. In option 1, further discussion will be needed for the case when there are no sufficient resources after applying option 1. In option 3, RSRP threshold might become high, so it might lead to large interference.  Regarding option 2, we do not see the benefit compared to option 3. Outcome is same as option 3, but wasted resource exclusion is needed compared to option 3. |
| vivo | Yes | Option 3 (at least) | If UE-A is intended receiver of UE-B, condition 1-B-1 can be used to compensate UE-B’s sensing result. In this case, option 3 can be applied assuming RSRP based resource exclusion. If condition 1-B-2 is used to coordination information, then either option 1/2/3 can be further considered.  If UE-A is any transmitter that relays the resource reservation of UE-B, or UE-A just inform its own transmission resource. option 3 should be applied. |
| OPPO | Yes | Option 2 | We also prefer to directly agree to Option 2, as the number of resources reported to MAC layer should be guaranteed. |
| Huawei, HiSilicon | Only option 1 | Option 1 | In option 2 and 3, since the available resource becomes less, RSRP threshold may need increments until the requirement of is satisfied. So option 2 and 3 may face the problem of high RSRP threshold and thus high interference.  Option 1 does not have such problem and is thus supported.  We also suggest the following changes on the FFS point to be clearer. Otherwise, it not clear what does “… non-overlapping non-preferred resource set…” mean.  ==  *FFS: whether/how to handle the case when ~~the number of single-slot resource(s) non-overlapping non-preferred resource set is smaller than a threshold~~ the requirement of*  *is not satisfied.* |
| Fujitsu | Yes | Option 1 |  |
| Sony | Yes | Option 2 or 3 | We prefer to exclude the non-preferred resource set before Step 7). |
| Panasonic | Yes | Option 2 |  |

* + 1. **Scheme 2**

**Question 4-6**: For Condition 2-A-1 of Scheme 2, which option(s) in the following agreement are supported to determine resource(s) where expected/potential resource conflict occurs. Companies are encourage to provide further details that should be clarified for the preferred option(s).

**Agreement**

* *For Condition 2-A-1 of Scheme 2, down-select one or more of following additional criteria to determine resource(s) where expected/potential resource conflict occurs*
  + *Option 1: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a RSRP threshold according to the priorities included in the SCI:*
    - *prio\_TX and prio\_RX are the priorities indicated in the SCI making the overlapping reservations*
    - *Strive to reuse Rel-16 specification wherever possible*
  + *Option 2: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is within a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.* 
    - *FFS: Whether the threshold depends on priority*
  + *Option 3: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) and the other UE is within a distance threshold of UE-B as determined by both UEs’ SCIs.*
  + *Option 4: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.* 
    - *FFS: Whether the threshold depends on priority*
  + *FFS: In case of collisions of resources for two UEs having TBs with UE A as destination UE, if needed*

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| *Intel* | *Option 2* | *We propose the following modifications*   * *For Condition 2-A-1 of Scheme 2, down-select one or more of following additional criteria to determine resource(s) where expected/potential resource conflict occurs*   + *Option 1: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a RSRP threshold according to the priorities included in the SCI:*     - *prio\_TX and prio\_RX are the priorities indicated in the SCI making the overlapping reservations*     - *Strive to reuse Rel-16 specification wherever possible*   + *Option 2: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is within a (pre)configured RSRP threshold(s) range compared to the RSRP measurement of UE-B’s reserved resource.*      - *FFS: Whether the threshold depends on priority*   + *Option 3: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) and the other UE is within a distance threshold of UE-B as determined by both UEs’ SCIs.*   + *Option 4: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.*      - *FFS: Whether the threshold depends on priority*   + *FFS: In case of collisions of resources for two UEs having TBs with UE A as destination UE, if needed* |
| Ericsson | Option 1 | This procedure is the one most similar to Rel-16 and can be used as guideline. Due to the limited time, we think it is better to try to re-use as much as possible existing procedure rather than creating completely new ones. |
| Fraunhofer | Option 1 and Option 3 | We support the triggering of UE-A to send a collision indicator on detecting an RSRP measurement larger than a threshold, while taking into consideration the distance between UE-A and UE-B. |
| Nokia, NSB | Option 1  Option 2  Option 4 | Option 1 and 4 apply only when UE-A is a destination UE of UE-B.   * + *Option 1: When UE-A is a destination UE of UE-B’s TB, The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a RSRP threshold according to the priorities included in the SCI:*     - *prio\_TX and prio\_RX are the priorities indicated in the SCI making the overlapping reservations*     - *Strive to reuse Rel-16 specification wherever possible*   + *Option 2: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is within a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.*      - *FFS: Whether the threshold depends on priority*   + *Option 3: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) and the other UE is within a distance threshold of UE-B as determined by both UEs’ SCIs.*   + *Option 4: When UE-A is a destination UE of UE-B’s TB, The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.*      - *FFS: Whether the threshold depends on priority* |
| Apple | Option 1 | We are also fine with Option 3 for groupcast. |
| LGE | Option 1, 4 | For Option 1, we think that the RSRP threshold boosting is not used since it is very unclear how to do it. As per agreement, UE-A would be at least one of conflicting TB (e.g. UE-B and/or UE-B whose reserved resource(S) are fully/partially overlapping in time-and-frequency). In this case, how to set prio\_TX and prio\_RX would be different depending on the relationship between UE-A and UE-B and other UE.  When UE-A is a destination UE of a TB transmitted by UE-B,   * Prio\_TX is indicated by UE-B’s SCI * Prio\_RX is indicated by other UE   When UE-A is a destination UE of a TB transmitted by other UE,   * Prio\_TX is indicated by other UE’s SCI * Prio\_RX is indicated by UE-B’s SCI   If UE-A is a destination of both UEs, UE-A will perform RSRP comparison with both RSRP thresholds individually to protect both transmission.  For option 4, similar approach could be adopted.  When UE-A is a destination UE of a TB transmitted by UE-B,   * RSRP measurement of other UE’s reserved resource is larger than *a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource*   When UE-A is a destination UE of a TB transmitted by other UE,   * RSRP measurement of UE-B’s reserved resource is larger than *a (pre)configured RSRP threshold compared to the RSRP measurement of other UE’s reserved resource*   In this case, even though interference level is high, UE-A may not determine the presence of resource conflict when can receive PSCCH/PSSCH from its intended transmitter since its RSRP is sufficiently high as well.  On the other hand, opposite direction (such as option 2 or option 3) seem not sufficient to protect UE-A’s reception. |
| Sharp | Option 1 |  |
| InterDigital | Option 4 | We think the conflict detection of Scheme 2 should be simplified and different from the Mode 2 sensing, as the purpose is not to obtain a resource, but to determine if an interference will be present at a reserved resource. Thus, the interference can be determined just based on an absolute RSRP threshold without considering priorities. |
| Spreadtrum | Option 1 |  |
| Qualcomm | Option 2  and Option 3 | A design goal of the Rel-16 resource selection procedure is to allow use of resources, even if another UE had already reserved them, if the measured RSRP of the existing reservation is small. Hence, having a UE reserve the same resource that has a reservation with a weak RSRP is not a conflict but an expected outcome of the resource procedure.  Option 2 (and Option 3) only declare the overlap a conflict if the UEs are close to each other. Either as an RSRP difference (Option 2) or a physical distance (Option 3). We provided simulation results for Option 2 in our contribution. |
| Samsung | Option 1 | For the FFS, we would like to consider the case two UE-Bs are transmitting to UE-A and have a conflicting reserved resource in this case,  - UE-A indicates to the UE-B with lower priority that it has conflict. The other UE-B has no conflict. |
| CATT, GOHIGH | Option 1 |  |
| NEC | Option 1 |  |
| NTT DOCOMO | Clarification | We would like to understand actual meaning of option 2 and option 4.  When RSRP measurement value of UE-B’s reservation is called RSRP-B and RSRP measurement value of other UE’s reservation is called RSRP-O,  - Option 2: condition is, RSRP-B – RSRP-O < threshold  - Option 4: condition is, RSRP-B – RSRP-O > threshold  The above is correct?  If correct, our preference is option 1 and option 2.  Option 1 uses absolute value of RSRP-O. Option 2 uses relative value of RSRP-O compared to RSRP-B. Both consider large interference, so it aligns with intention of scheme 2.  Meanwhile, Option 4 means collision indication is transmitted to avoid collision with small interference. We are not sure why large interference is ignored and small interference is addressed. |
| vivo | Option 1 | For option 2, when UE-C’s and UE-B’s resources are partially overlapped, even UE-C’s RSRP is quite large, it is not correct to say UE-B is always interfered by UE-C, since UE-C may decode the resource successfully. However, if companies insist on different options, we can make each option to be configurable. |
| OPPO | Option 1 | Prefer to reuse Rel-16 behaviour as much as possible. |
| Huawei, HiSilicon | Option 1 | Option 1 is similar to R16 procedures, i.e., comparing the measured RSRP with a RSRP threshold. Since R16 sensing procedure works well, we think it’s straightforward to reuse similar ideas. Thus, Option 1 is supported, and other options are not necessary.  In Option 2 and 4, it seems UE-A needs to measure two RSRP, calculate the RSRP difference, and compare the RSRP difference with a RSRP threshold. This design is quite different from R16, the applicable scenarios and benefits are unclear. |
| Fujitsu | Option 2 | We think Intel’s modification captures the intension better. |
| Futurewei | Option 1 | The difference between option 2 and 4 is the RSRP measurement for the conflict is within a threshold (close to RSRP measurement of UE-B) or larger than a threshold. Both use RSRP measurement of UE-B as a reference, which is applicable when UE-A is the receiver for both UE-B and the UE with resource conflict. So if the RSRP from conflict is larger than the threshold, e.g., the lower bound of RSRP range as in option 2, UE-A should report the conflict for UE-B reselecting resource to avoid the conflict. If UE-A is not a receiver of the conflict TB, it is not necessary to use the relative RSRP threshold. Option 1 can be used.  For simplicity, Option 1 is preferred. |
| Sony | Option 1 |  |
| Panasonic | Option 1 |  |

**Question 4-7**: For allocating PSFCH resources in Scheme 2, which of following parameter(s) are separately (pre)configured from those for SL HARQ-ACK feedback? Please specify any restriction when separately (pre)configuring a certain parameter if necessary. If a certain parameter is not separately (pre)configured, provide your views how to derive PSFCH resources allocated for Scheme 2.

* Option 1: Set of PRBs for PSFCH transmission/reception (sl-PSFCH-RB-Set)
* Option 2: Period of PSFCH resources (sl-PSFCH-Period)
* Option 3: Number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB (sl-NumMuxCS-Pair)
* Option 4: Number of PSFCH resources available for multiplexing information in a PSFCH transmission (sl-PSFCH-CandidateResourceType)
* Option 5: Scrambling ID for sequence hopping of PSFCH (sl-PSFCH-HopID)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| *Intel* | *All Options* | Period of PSFCH resources for inter-UE coordination feedback is larger or equal to period of PSFCH resource for HARQ feedback (resulting in inter-UE coordination feedback slots being a subset of HARQ resources) |
| Ericsson | Option 1 | We think physical separation must be possible. Once this is possible, there is little motivation for further changes. In addition, we think Option 2 is highly undesirable in terms of latency and overhead. |
| Fraunhofer | All options |  |
| Nokia, NSB | Option 3  Option 4 | To minimize overhead of Scheme 2, the unused RBs in PSFCH symbols configured for HARQ-ACK feedback can be used for Scheme 2. Thus, sl-PSFCH-RB-Set and sl-PSFCH-Period do not need to be separately (pre)configured. |
| Apple | Option 1 | We only need to separate the frequency resources for inter-UE coordination scheme 2. The other parameters could re-use what is defined for SL HARQ-ACK. |
| LGE | At least Option 1 | At least set of PRBs for PSFCH TX/RX needs to be separately (pre)configured from those for SL HARQ-ACK feedback.  According to Rel-16 PSFCH, the number of PRBs for PSFCH TX/RX should be a multiple of the number of sub-channels in a resource pool and the number of PSSCH slots associated with the same PSFCH occasion. In this case, this restriction is not always ensured when the set of PRBs for PSFCH TX/RX in Scheme 2 is determined by set of PRBs associated with 0 of sl-PSFCH-RB-Set for SL HARQ-ACK feedback.  For other parameters, either way is fine between a separate (pre)configuration or taking the same values of SL HARQ-ACK feedback.  Regarding PSFCH period in Scheme 2, its value should not be less than that of SL HARQ-ACK feedback.  Regarding the number of CS pair, it is highly related to target delay spread, so its value should not be greater than that of SL HARQ-ACK feedback. |
| Sharp | All options | In order to co-exist with Rel-16 sidelink, it should be possible to deploy the inter-UE coordination feature by only adding optional Rel-17 specific parameters to sidelink configurations, without changing existing Rel-16 parameters. In that sense it should not be assumed that the “unused PRBs” in a PSFCH slot are always sufficient for signalling of resource conflict. Therefore, Option 1 should not be mandated. Instead, it should be possible to configure either or both of the “unused PRBs” and “used PRBs” for PSFCH, and in the latter case, any unused PSFCH resource (e.g. cyclic shifts) can be configured for scheme 2.  In addition, we think the support for scheme 2 should also be possible even in a resource pool not configured with any PSFCH resource, or else scheme 2 would be much less useful. Details can be further discussed. |
| InterDigital | All options | In our view it is important to be pre-configured separately as a resource pool may not have PSFCH for HARQ feedback configured, i.e., no PSFCH resource for HARQ transmission. |
| Spreadtrum | All options | We think PSFCH resource mapping for SL HARQ in R16 should be reused as much as possible. |
| Qualcomm | Option 1 | Only separation in frequency (Option 2) is needed and this option is backward compatible with Rel-16 and allows coexistence in the same pool.  Options 2 and Option 4 would cause coexistence issues with Rel-16 UEs and complicate specification work.  We don’t think Option 5 necessary once Option 1 is adopted. |
| Samsung | Option 1 and/or new Option 6 | PSFCH resources can be distinguished by time slot, PRB or cyclic shift.  Option 1: different PRB sets for HARQ-ACK PSFCH and Conflict PSFCH. Remaining parameters remain the same.  If sl-PSFCH-RB-Set, sl-PSFCH-Period, sl-NumMuxCS-Pair, sl-PSFCH-CandidateResourceType are configured the same, HARQ-ACK PSFCH resources and Conflict PSFCH resources can be distinguished by different m\_0 values (different cyclic shifts). For example, if n\_cs^PSFCH = 3, m\_0 for conflict PSFCH can be 1, 3, and 5.  Therefore, we would like to add option 6:  Option 6: m\_0 (Table 16.3-1 of TS 38.213). |
| CATT, GOHIGH | Option 1 | From our understanding, only separated frequency resource is necessary. |
| NEC | Option 1,  Option 3,  Option 4 | We think option 2 is not needed. Same PSFCH period should be kept considering consistent Rx/Tx transition. |
| NTT DOCOMO | At least 1, optionally 3 | At least PRB should be different from HARQ feedback, otherwise, scheme 2 leads to degradation of HARQ feedback performance due to more collisions.  Regarding Option 3, required performance is different from HARQ feedback, e.g. more CS pairs will be available with less PRBs for scheme 2. |
| vivo | All options | Separated configuration is straightforward and flexible |
| OPPO | Option 1 | Other parameters can be same as those for HARQ-ACK feedback. |
| Huawei, HiSilicon | Option 3 | Generally, in order to avoid additional signalling overhead, we prefer to reuse R16 PSFCH (pre-)configurations if they work well.  Option 3: since the contents of conflict indication are different from legacy PSFCH, so they may need different number of cyclic shifts. Thus, a separate (pre-)configuration is needed.  Option 1: There is no need for separate (pre-)configuration. The unused PSFCH resources with the “0” in the bit string by the higher layer parameter *sl-PSFCH-RB-Set* can be used for collision indication.  For other options, so far the benefits are unclear, more justifications are needed. |
| Fujitsu | Option 1  Option 3  Option 4 | In our view, to save PSFCH overhead, period of PSFCH may not be separately configured. |
| Sony | All options | We prefer the simplest solution. |
| Panasonic | At least Option 1 | PRB of PSFCH for scheme 2 should be able to be separated from rel.16 PSFCH by configuration. |

**Question 4-8**: For determining PSFCH resource in Scheme 2, how to set the value of P\_ID, M\_ID, m\_CS as specified in TS 38.213 Section 16.3? Companies are encourage to provide further details that should be clarified for the preferred option(s).

* For P\_ID,
  + Option 1-1: L1-Source ID indicated by UE-B’s SCI
  + Option 1-2: Other (please specify it)
* For M\_ID,
  + Option 2-1: 0
  + Option 2-2: Other (please specify it)
* m\_CS,
  + Option 3-1: 0 for Condition 2-A-1, 6 for Condition 2-A-2
  + Option 3-2: 0 for both Condition 2-A-1 and Condition 2-A-2
  + Option 3-3: Other (please specify it)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Intel | Option 1-1  Option 2-1  Option 3-1 | Option 2-1 if dedicated resources for inter-UE coordination feedback are allocated |
| Ericsson | Option 1-1, Option 2-1 and Option 3-2 | We think it is desirable to reuse existing procedures as much as possible given the little time left. Besides that, we do not see the motivation for differentiating conditions. |
| Nokia, NSB | Option 1-1  Option 2-1  Option 3-1 |  |
| Apple | Option 1-1  Option 2-1  Option 3-2 | We think the existing specifications on PSFCH resource mapping (for SL HARQ) could be largely reused for Inter-UE coordination scheme 2. |
| LGE | Option 1-1  Option 2-1  Option 3-1 | In case of Condition 2-A-2, UE-A is intended receiver of UE-B while in condition 2-A-2, there is a possibility that UE-A is not intended receiver of UE-B. In this case, if the resource conflict is determined by Condition 2-A-2, and if UE-B will use its reserved resource for PSCCH/PSSCH to UE other than UE-A, UE-B no longer needs to consider the resource conflict in its resource re-selection. To do this, it is necessary that UE-A informs which condition is used.  Moreover, depending on the condition, when UE-B performs resource re-selection, resources to be avoided would be different. To be specific, in case of Condition 2-A-2, UE-B needs to avoid all the resources in a slot where expected resource conflict occurs in its resource re-selection. On the other hand, in case of Condition 2-A-1, UE-B will avoid time-and-frequency indicated by its SCI where expected resource conflict occurs. |
| Sharp | Option 1-2  Option 2-1  Option 3-2 | For “P\_ID”, it is proposed to use the starting sub-channel or the starting PRB of the reserved resource instead. Unlike general HARQ-ACK where it is desirable to have separate HARQ-ACK resources for two (e.g. slightly overlapping) PSSCHs transmitted by different UEs, the nature of conflict indication is a bit similar to the “NACK only” signalling for groupcast Option 1 (in terms of resource usage), i.e. ideally a same conflict indication transmission using a single time/frequency/code resource is monitored by all Ues attempting to detect the conflict. And even if this ideal case is not possible, the number of resources used should be minimized, otherwise it would result in unnecessary waste of PSFCH resources, and lower power in transmitting each conflict indication. Differentiating SRC IDs in “P\_ID” obviously makes the resource utilization almost always worst.  For “m\_CS”, similarly to other companies, we do not see any motivation to differentiate the conditions. |
| InterDigital | Option 1-1  Option 2-1  Option 3-1 | We think it is important to separate condition 2-A-1 and condition 2-A-2, as for 2-A-2, the resource selection by UE-B may exclude all resources in one slot from Set A in its sensing for resource re-selection. |
| Spreadtrum | Option 1-1  Option 2-1  Option 3-1 | We think PSFCH resource mapping for SL HARQ in R16 should be reused as much as possible.  The conflict types should be distinguished through option 3-1. UE-B’s behaviour will be different with different conditions.  For condition 2-A-1, the resource that UE-B reselected can be the same as the conflict resource in time domain. For condition 2-A-2, the resource that UE-B reselected cannot be the same as the conflict resource in time domain to solve half-duplex problem. |
| Qualcomm | Option 1-1, Option 2-1,  Option 3-3 | We’re not clear that there’s a need to distinguish between resources indicated due to 2-A-1 or 2-A-2 since UE-B’s action is the same: reselect the conflicting resource. Therefore, both can use the same m\_CS. However, this shouldn’t be fixed to 0 since UE-A needs to indicate which reservation is causing the conflict in order for UE-B to know which resource needs to be selected.  Option 3-3:   * m\_CS = 0 if the first reservation in UE-B’s SCI causes the conflict. * m\_CS = 6 if the second reservation in UE-B’s SCI causes the conflict.   The combination of Option 3-3 above and reusing the existing SCI-PSFCH mapping rules provides UE-B with all the information it needs to reselect the conflicting resource. |
| Samsung | Option 1-1  Option 2-1  Option 3-2 |  |
| CATT, GOHIGH | Option 1-1  Option 2-1  Option 3-2 |  |
| NEC | Option 1-1  Option 2-1  Option 2-2  Option 3-2 | For M\_ID, if multiple UE-A sends scheme 2 information to UE-B in a shared resource or UE-A is the intended receiver of UE-B, then option 2-1 is applicable.  If multiple resources for multiple UE-As are needed, then option 2-2: UE-A’s ID is needed. |
| NTT DOCOMO | 1-1  2-1  3-1 | 1-1 should be agreed so that UE-B can know the indication is transmitted to the UE-B. Otherwise, from UE-B, target UE of the indication is unclear.  3-1 is important to understand what is the issue of reservation. If condition 2-A-1, UE-B can select another resource at the same slot. If condition 2-A-2, any resource at the same slot is unavailable and UE-B selects resource from other slot. |
| vivo | Option 1-1  Option 2-1  FFS Option 3-1/2 |  |
| OPPO | Option 1-1  Option 2-1  Option 3-2 |  |
| Huawei, HiSilicon | 1-1 with comments.  2-1.  3-3. | This is issue is not urgent compared to others. It has little or no dependencies with other issues. We suggest spending time on more important matters first.  1-1: when UE-A is not the destination UE of UE-B, what is the L1-Source ID?  2-1: ok  3-3: 5 cyclic shifts are needed. Details are given below:  3 cyclic shifts for Condition 2-A-1 case 1 (overlapping between UE-B’s and other UEs’ reserved resource(s) )  Generally, the resource conflict situations may include many cases, e.g., conflict happens on one, or two, or multiple of those dynamically and/or periodically reserved resources by UE-B. RAN1 needs to discuss whether the conflict indication from UE-A needs to differentiate different conflict situations, and which resource(s) should UE-B reselect accordingly.  Considering the signalling overhead, we propose UE-A indicates the conflict situation about the next up to two reserved resources of UE-B.  For example, as shown in the figure below, assume UE-A detects UE-B’s 3rd reserved resource collides with other UEs and send conflict indication before UE-B’s 2nd reserved resource. Then, UE-B can re-select the 3rd resource before actually transmitting on the 2nd reserved resource, and the re-selected 3rd resource can be indicated in the SCI transmitted on the 2nd resource. Thus, the chain reservation is guaranteed.    **Illustration of UE-B’s reservations**  As there are three cases for the conflict situation of the 2nd and 3rd resource, 3 cyclic shifts are needed to distinguish the three cases.  1 cyclic shifts for Condition 2-A-1 case 2 (indication related to step 5)  If UE-A detects no UE transmitted SCI with periodic reservations on UE-B’s non-monitored slot, UE-A can indicate to UE-B about this. Thus, UE-B does not need to exclude all the sub-channel in those slots due to non-monitored slot as defined in step 5 of sensing and resource selection procedure of Rel-16. This can avoid excessive excluding resources from step 5.  1 cyclic shifts for Condition 2-A-2 (half-duplex indication)  For condition 2-A-2, considering half-duplex operation, when UE-B’s reservation resources overlap with UE-A’s transmission resources, where UE-A is the intended receiver of UE-B, UE-A cannot receive UE-B’s information due to half-duplex operation. Therefore, 1 cyclic shift is needed for Condition 2-A-2.  In summary, the following 5 sequences are needed for expected conflict indication and related UE-B’s behaviors are defined as following table:   |  |  |  | | --- | --- | --- | | **Index** | **Meaning of such conflict indication** | **UE-B’s behaviour upon receiving such indication** | | 1 | Only the 2nd resource indicated in UE-B’s SCI is conflicted | Re-select 2nd reserved resources indicated as collision by UE-A | | 2 | Only the 3rd resource indicated in UE-B’s SCI is conflicted | Re-select 3rd reserved resources indicated as collision by UE-A | | 3 | Both 2nd and 3rd resources indicated in UE-B’s SCI are conflicted | Re-select 2nd and 3rd reserved resources indicated as collision by UE-A | | 4 | No UE transmitted SCI with periodic reservation on the non-monitored slot of UE-B | UE-B skips step 5 as indicated by UE-A | | 5 | Half-duplex occurs for UE-A, i.e. Condition 2-A-2 | UE-B re-selects resources belonging to that slot, and the re-selected resources shall not be on that slot | |
| Fujitsu | Option 1-1  Option 2-1  Option 3-2 |  |
| Sony | Option 1-1  Option 2-1  Option 3-2 |  |
| Panasonic | Option 1-1  Option 2-1  Option 3-2 |  |

**Question 4-9**: For determining PSFCH occasion in Scheme 2, which option(s) are supported? Companies are encourage to provide further details that should be clarified for the preferred option(s).

* Option 1: PSFCH occasion is derived by a slot where UE-B’s SCI is transmitted
* Option 2: PSFCH occasion is derived by a slot where expected/potential resource conflict occurs on PSSCH resource indicated by UE-B’s SCI

|  |  |  |
| --- | --- | --- |
| **Company** | **Option(s)** | **Comment** |
| Intel | Option 2 | We see ambiguity issue in Option 1 given that if two UEs reserve resources in the same slot in future but transmit SCI with reservation in different slots then first UE that has reserved resource earlier does not know slot where SCI from the 2nd UE results in expected/potential conflict |
| Ericsson | Option 1 | Using Option 1 the PSFCH resource allocation procedures can be mostly reused. |
| Fraunhofer | Option 2 | We agree with Intel’s example and would also prefer option 2. |
| Nokia, NSB | See comments | Both options have pros and cons.  With Option 1, UE-A provides the conflict indication as early as possible, which gives UE-B more time to resolve the conflict. However, if the conflict is triggered by a higher priority UE, it may not be possible to indicate the conflict to the lower priority UE (i.e., correponding PSFCH occasion already passed when conflict is detected), so the higher priority UE would re-select (which is undesirable).  With Option 2, UE-A provides the conflict indication as late as possible (i.e., just before the conflict occurs). This allows UE-A to indicate the conflict to the lower priority UE. However, it adds latency and it may not be possible to unambiguously indicate the conflict to only one UE (e.g., in case all subchannels overlap), so both UEs may need to re-select. |
| Apple | Option 1 | Option 1 has the benefit to allow UE-B to reselect resource earlier in case of collision. Its specification impact is also low since the existing mechanism of PSFCH for SL HARQ transmission could be largely reused.  In Option 2, UE-A may need to make two transmissions of inter-UE coordination if both reserved resources have collision. This is not preferred. |
| LGE | Option 2 | First of all, considering that the factors appears after UE-A’s inter-UE coordination information transmission cannot be used to determine the presence of the resource conflict, Option 1 can be used in very limited scenario. Moreover, the time gap between SCI and its reserved resource would be high (e.g. few hundreds of msec), Option 1 cannot be used a variety of situations.  Regarding the latency problem, the inter-UE coordination information just needs to be transmitted before the resource with resource conflict subject to processing time budget. According to pre-emption check, a UE will perform pre-emption check T\_3 slots before the target resource, but not slot where SCI with resource reservation. In our understanding, similar approach could be used and it is not a problem.  As per the answer of Q4-8, UE-A can still transmit PSFCHs individually to different UEs by using their source ID in the same PSFCH occasion. |
| Sharp | Option 2 | Agree with Intel’s example.  And regarding Option 1, we would like to ask for clarifications on when (i.e. the exact slot range) UE-A is allowed to **detect** a resource conflict for any detected SCI. By definition, detection of a resource conflict precedes signalling of that resource conflict. For example, if we adopt Option 1, and if UE-B transmits a SCI in slot n, then the resource for **signalling** of resource conflict would be a few slots after slots n, e.g. slot n+4, would that mean only SCIs transmitted by a UE-C between slot n and slot n+4 (without even considering processing time here) reserving conflicting resources can be detected as a “resource conflict” by UE-A, and SCIs transmitted by a UE-C after slot n+4 reserving conflicting resources cannot be detected/signalled as a “resource conflict”? |
| InterDigital | Option 2 | We think Option 2 is at least required to determine a latest PSFCH occasion. If there are multiple PSFCH occasions between the slot where UE-B’s SCI is transmitted and the latest PSFCH occasion, UE-A can select one of them, however, that will require UE-B to monitor each PSFCH occasion during the period and also UE-A might miss conflicting resources in the sensing. Thus we think the PSFCH occasion can be the latest PSFCH occasion based on Option 2. |
| Spreadtrum | Option1 | In option 1, UE-B can have more time to re-select resource. |
| Qualcomm | Option 1 | This reuses existing Rel-16 mapping rules and, in combination with Option 3-3 in Q4-8, provides UE-B with all the necessary information to avoid the conflict with low latency. |
| Samsung | Option 1 | Reuse PSFCH procedure as much as possible. |
| CATT, GOHIGH | Option 1 | Option 2 will introduce an extra delay due to waiting for the related PSFCH occasion. |
| NEC | Option 2 | Determined by the SCI slot is too early to fully cover resource conflicts caused by aperiodic UL or SL transmission(s) within the long reservation period. |
| NTT DOCOMO | Option 2 | Agree with Intel’s example.  And in the example, if UE-A shall transmit collision indication to UE that reserved later than another UE reserving same resource, it means that the collision indication might be transmitted to UE having a TB with higher priority. The TB’s transmission might not be completed within PDB, which is undesirable approach. Rather, resource for TB with lower priority should be reselected, to achieve this, option 1 should not be supported. (i.e. agree with Nokia’s analysis for option 1.)  Regarding option 2, latency is improved compared to Rel-16 UE since in Rel-16 UE case, UE-B notices the collision based on HARQ feedback after the TX on the collided resource. We do not see any issue on option 2 from latency perspective. Double collision indications and ambiguity of indication target are invalid. UE-A can select one UE-B based on priority (UE with lower priority TB should be selected) and the indication target can be known based on PSFCH resource selection (option 1-1 of question 4-8 above). |
| vivo | Option 2 | The conflict between reservation SCI and reserved PSSCH can be detected by option 2. However, option 1 cannot. |
| OPPO | Option 2 | Agree with the example of Intel. |
| Huawei, HiSilicon | Option 1 | This is issue is not urgent compared to others. It has little or no dependencies with other issues. We suggest spending time on more important matters first.  Option 1 is reusing R16 PSSCH-PSFCH mapping rule, which works well and simple.  If Option 2 is adopted, RAN1 needs to discuss many additional issues, e.g., processing time, mapping rule, etc.  Considering the workload and limited time, we support Option 1. |
| Fujitsu | Option 2 | As commented by companies, although Option 1 can notify UE-B earlier on a PSFCH occasion, it cannot identify or notify the conflict occurred after the PSFCH occasion. Option 2 can identify more collisions by notifying UE-B as late as possible. |
| Sony | Option 2 | We think the option 2 would be better considering Intel’s example. |
| Panasonic | Option 2 | We agree with Intel’s example. |

1. **Summary of contributions**

* Details on supported conditions (i.e. Condition 1-A-1/1-B-1/2-A-1/2-A-2) to determine inter-UE coordination information
  + Condition 1-A-1
    - RSRP threshold
      * If inter-UE coordination information is triggered by an explicit request
        + Determined by RX priority indicated by the received SCI and TX priority indicated by UE-B’s request

Supported by [Huawei,1] [Fujitsu,6] [LGE,27] [InterDigital,28] (5)

* + - * + Indicated by UE-B’s request

Supported by [ZTE,26]

* + - * + Indicated by a separate (pre)configuration

Supported by [Intel,21]

* + - * If inter-UE coordination information is triggered without an explicit request
        + Determined by RX priority indicated by the received SCI and TX priority indicated by a (pre)configuration

Supported by [LGE,27]

* + - * + Indicated by a separate (pre)configuration

Supported by [Intel,21]

* + - * + Determined by RX priority indicated by the received SCI and TX priority indicated by a PC5-RRC signaling

Supported by [Huawei,1]

* + - * + Determined by RX priority indicated by the received SCI and TX priority indicated by UE-B’s prior SCI

Supported by [InterDigital,28]

* + - * Whether or not to boost up the RSRP threshold
        + Fixed [Intel,21]
        + Can be boosted up
    - SINR estimated by UE-A is used [Fujitsu,6]
    - UE-A uses SCIs received before n-(T\_proc,0+T\_proc,1) for generating inter-UE coordination information transmitted in slot n [LGE,27]
  + Condition 1-B-1
    - When RSRP measurement is higher than a threshold
      * Supported by [Intel,21] [LGE,27] [Apple,30] (3)
      * Objected by [Qualcomm,33]
      * Details on RSRP threshold
        + If inter-UE coordination information is triggered by an explicit request

Determined by RX priority indicated by the received SCI and TX priority indicated by UE-B’s request

Supported by [Huawei,1] [CATT,10] [LGE,27] [InterDigital,28] [Apple,30] (5)

Indicated by UE-B’s request

Supported by [CATT,10] [ZTE,26] [Apple,30] (3)

Indicated by a separate (pre)configuration

Supported by [Intel,21]

* + - * + If inter-UE coordination information is triggered without an explicit request

Determined by RX priority indicated by the received SCI and TX priority indicated by a (pre)configuration

Supported by [LGE,27] [Apple,30] (2)

Indicated by a separate (pre)configuration

Supported by [Intel,21] [Apple,30] (2)

Determined by RX priority indicated by the received SCI and TX priority indicated by a PC5-RRC signaling

Supported by [Huawei,1]

Determined by RX priority indicated by the received SCI and TX priority indicated by UE-B’s prior SCI

Supported by [InterDigital,28]

* + - * + Whether or not to boost up the RSRP threshold

Fixed [Intel,21]

Can be boosted up

* + - When UE-A is a destination of other UE’s reserved resource and when its RSRP measurement is smaller than a threshold
      * Supported by [CATT,10] [Qualcomm,33] (2)
    - When RSRP measurement is within (pre)configured SL-RSRP range and priority of reserved resources of other UE is belonging to (pre)configured set of priority levels
      * Supported by [Intel,21]
    - SINR estimated by UE-A is used
      * Supported by [Fujitsu,6]
    - UE-A uses SCIs received before n-(T\_proc,0+T\_proc,1) for generating inter-UE coordination information transmitted in slot n [LGE,27]
  + Condition 2-A-1
    - Which SCI(s) are used to determine resource conflict
      * Transmitted in slot(s) containing UE-B’s SCI with Scheme 2 enabled
        + Supported by [CATT,10] [CAICT,13] [Intel,21] [DCM,22] [InterDigital,28] [Apple,30] (6)
      * Transmitted in non-monitored slot of UE-B
        + Supported by [Huawei,1]
      * Time gap between detected SCIs is smaller than the processing delay
        + Supported by [Lenovo,19]
      * Transmitted in slot(s) belonging to UE-A’s TX resource pool
        + Supported by [LGE,27]
    - Additional condition
      * RSRP measurement of other-UE’s reserved resource is higher than a threshold [Huawei,1] [vivo,5] [CATT,10] [Lenovo,19] [MediaTek,20] [DCM,22] [LGE,27] [Apple,30] [BOSCH,34] (9)
        + RSRP threshold is determined based on UE-B’s priority as TX priority and other UE’s priority as RX priority [LGE,27]
      * Distance between UE-A and UE-B is smaller than a (pre)configured distance range [CATT,10] [Fraunhofer,15] [Intel,21] [Qualcomm,33] (4)
      * RSRP measurement of UE-B’s transmission is higher than a threshold [Intel,21] [DCM,22] [LGE,27] (3)
      * UE-A does not successfully decode UE-B’s transmission when UE-A is a destination of UE-B’s transmission [Huawei,1] [Fujitsu,6] (2)
      * Distance between UEs with conflicting TB is within a (pre)configured range [Intel,21] [BOSCH,34] (2)
      * RSRP measurement difference between conflicting TBs is smaller than a (pre)configured threshold [Nokia,3] [Qualcomm,33] (2)
      * UE-A determines that UE-B needs to perform pre-emption operation [ZTE,26] [LGE,27] (2)
      * The portion of RBs/sub-channels shared by different PSSCHs is larger than a (pre)configured threshold [Fujitsu,6] [LGE,27] (2)
      * UE-A judges that UE-B determines NACK for the TB for the resource reserved by UE-B [vivo,5]
      * Priority of UE-B’s transmission is smaller than a threshold [Spreadtrum,4]
      * Priority of UE-B’s transmission is higher than a threshold [BOSCH,34]
      * CBR is higher than a threshold [BOSCH,34]
  + Condition 2-A-2
    - Which SCI(s) are used to determine resource conflict
      * Transmitted in slot(s) containing UE-B’s SCI with Scheme 2 enabled
        + Supported by [CATT,10] [CAICT,13] [Intel,21] [DCM,22] [InterDigital,28] [Apple,30] (6)
      * Transmitted in non-monitored slot of UE-B
        + Supported by [Huawei,1]
      * Time gap between detected SCIs is smaller than the processing delay
        + Supported by [Lenovo,19]
      * Transmitted in slot(s) belonging to UE-A’s TX resource pool
        + Supported by [LGE,27]
    - Confirm the working assumption to support Condition 2-A-2
      * Supported by [Futurewei,2] [Spreadtrum,4] [Mitsubishi,9] [CATT,10] [Fraunhofer,15] [Samsung,18] [DCM,22] [Panasonic,23] [ETRI,25] [ZTE,26] [InterDigital,28] [Apple,30] (12)
      * Further clarification on when UE-A does not expect to perform SL reception from UE-B [vivo,5] [DCM,22] [Apple,30] (3)
    - Additional condition
      * Distance between UE-A and UE-B is smaller than a (pre)configured distance range [Intel,21] [LGE,27] [BOSCH,34] (3)
      * UE-A does not successfully decode UE-B’s transmission when UE-A is a destination of UE-B’s transmission [Huawei,1] [Fujitsu,6] (2)
      * Priority of UE-A’s is higher than priority of UE-B’s transmission [Nokia,3]
      * RSRP measurement of UE-B’s transmission is within (pre)configured RSRP range [Intel,21]
      * Distance between UEs with conflicting TB is within a (pre)configured range [Intel,21]
* Contents of inter-UE coordination information and its request
  + Contents of the inter-UE coordination information in Scheme 1
    - Set of resources
      * Form of the set of resources
        + Set of sub-channel(s) [Intel,21] [LGE,27] (2)

If inter-UE coordination is triggered by UE-B’s request

Number of sub-channels

1 [Intel,21]

(pre)configured value [Intel,21]

Indicated by UE-B’s request [LGE,27](for preferred resource)

Indicated by other UE’s SCI [LGE,27](for non-preferred resource)

Resource reservation period

0 [Intel,21] [LGE,27] (for non-preferred resource)

(Pre)configured value [Intel,21]

Indicated by UE-B’s request [LGE,27](for preferred resource)

Resource reselection counter

0 [LGE,27] (for non-preferred resource)

Indicated by UE-B’s request [LGE,27](for preferred resource)

If inter-UE coordination is triggered without UE-B’s request

Number of sub-channel

1 [Intel,21]

(pre)configured value [Intel,21] [LGE,27](for preferred resource)

Indicated by other UE’s SCI [LGE,27](for non-preferred resource)

Resource reservation period

0 [Intel,21] [LGE,27] (for non-preferred resource)

(Pre)configured value [Intel,21] [LGE,27](for preferred resource)

Resource reselection counter

(Pre)configured value [LGE,27](for preferred resource)

* + - * + Set of candidate single-slot resources for UE-B’s transmission [Huawei,1] [Fujitsu,6] [OPPO,7] [ZTE,26] [InterDigital,28] (4)

If inter-UE coordination is triggered without UE-B’s request, relevant information is

Indicated by PC5-RRC [Huawei,1]

Indicated by UE-B’s prior SCI [InterDigital,28]

* + - * + Resource map [Apple,30]
      * Indication mechanism
        + TRIV with extended window and FRIV without indication of sub-channel size [Nokai,3]
        + TRIV with extended window and Rel-16 FRIV [Nokia,3]
        + Resource indicator value to indicate 2-demension resources with same or different sub-channel size [Nokia,3]
        + Start time of resource selection window for the inter-UE coordination information [Intel,21]
        + End time of resource selection window for the inter-UE coordination information [Intel,21]
        + Set(s) of Rel-16 TRIV, FRIV, resource reservation period, reference starting position of TRIV [Qualcomm,33] [LGE,27]
    - Resource set type [Huawei,1] [OPPO,7] [Fraunhofer,15] [Zhejiang Lab,16] [Hyundai,17] [Samsung,18] [ETRI,25] (7)
    - Identifier to identify a UE receiving this coordination information [Huawei,1] [Fujitsu,6] [Fraunhofer,15] [Samsung,18] [Intel,21] [LGE,27] (6)
    - TX Priority [Huawei,1] [NEC,8] [Apple,30] [ASUSTeK,32] (4)
    - RSRP of reserved resources [Fujitsu,6] [Apple,30] [ASUSTeK,32] (3)
    - Resource reservation period [Huawei,1]
    - Identifier to identify a UE transmitting this coordination information [Huawei,1] [Samsung,18] (2)
    - Target destination ID to be used for UE-B’s transmission [Fujitsu,6] [LGE,27] (2)
    - Zone ID and communication range requirement [Samsung,18]
    - Source ID of other UE’s reserved resources [Intel,21]
    - Feedback timestamp [Intel,21]
    - Indicator to indicate whether coordination information is assistance type or scheduling type [Convida,31]
  + Contents of the explicit request in Scheme 1
    - TX parameters associated with UE-B’s transmission
      * TX priority [Huawei,1] [Futurewei,2] [Fujitsu,6] [OPPO,7] [NEC,8] [CATT,10] [CMCC,11] [CEWiT,12] [Xiaomi,14] [Fraunhofer,15] [Zhejiang Lab,16] [Samsung,18] [Lenovo,19] [ZTE,26] [LGE,27] [InterDigital,28] [Apple,30] (17)
      * Resource reservation period [Huawei,1] [Futurewei,2] [OPPO,7] [CATT,10] [CMCC,11] [LGE,27] [Apple,30] (7)
      * Resource selection window [Huawei,1] [Futurewei,2] [CATT,10] [CMCC,11] [Xiaomi,14] [Lenovo,19] [LGE,27] (7)
      * Number of sub-channel(s) [Huawei,1] [Futurewei,2] [OPPO,7] [NEC,8] [CATT,10] (5)
      * TX resource pool [OPPO,7] [NEC,8] [Lenovo,19] [ZTE,26] (4)
      * Resource reselection counter [CATT,10] [LGE,27] (2)
      * Number of (re)transmissions [Apple,30]
      * TBS [Nokia,3]
    - Remaining packet PDB [Futurewei,2] [OPPO,7] [CMCC,11] [CEWiT,12] [Xiaomi,14] [Fraunhofer,15] [Zhejiang Lab,16] [Samsung,18] [ZTE,26] [InterDigital,28] [Apple,30] (11)
    - Indicator to indicate resource set type (preferred or non-preferred set) [Nokia,3] [CATT,10] [Samsung,18] [Lenovo,19] [ZTE,26] [InterDigital,28] [Apple,30] (7)
    - Identifier to identify a UE transmitting this request [Huawei,1] [CMCC,11] [Samsung,18] [LGE,27] (4)
    - Identifier to identify a UE receiving this request [Huawei,1] [CMCC,11] [Samsung,18] [LGE,27] (4)
    - Number of resources to be reported in UE-A’s inter-UE coordination information [Nokia,3] [Fujitsu,6] [Xiaomi,14] [Lenovo,19] (4)
    - Resources reserved for UE-A’s inter-UE coordination information transmission [Nokia,3] [Fujitsu,6] (2)
    - Zone ID and communication range requirement [Samsung,18] [InterDigital,28] (2)
    - Latency bound of inter-UE coordination information [Futurewei,2] [LGE,27] (2)
    - Traffic type [Futurewei,2]
    - Set of resources for UE-B’s transmission determined by UE-B [Nokia,3]
  + Contents of the inter-UE coordination in Scheme 2
    - Location of resource(s) indicated by UE-B’s SCI with resource conflict [Huawei,1] [Zhejiang Lab,16] [Qualcomm,33] (3)
    - Indicator to indicate either Condition 2-A-1 or Condition 2-A-2 [Nokia,3] [Intel,21] [LGE,27] (3)
    - Indicator to indicate whether there is periodic reservation from other UEs on non-monitored slots of UE-B [Huawei,1]
* Container of inter-UE coordination information and its request
  + Container of the inter-UE coordination information in Scheme 1
    - SCI format 1-A [Futurewei,2] [Nokia,3] [vivo,5](for non-preferred resource) [Fujitsu,6] [CMCC,11] [CAICT,13] [Hyundai,17] [MediaTek,20](for non-preferred resource) [Sharp,29] (9)
      * Stand-alone PSCCH [Futurewei,2] [Nokia,3]
    - New 2nd-stage SCI format [Huawei,1] [vivo,5](for preferred resource) [OPPO,7] [Mitsubishi,9] [CATT,10] [CMCC,11] [CEWiT,12] [Xiaomi,14] [Fraunhofer,15] [Zhejiang Lab,16] [Samsung,18] [MediaTek,20](for preferred resource) [Sony,24] [Apple,30](for preferred resource) [Qualcomm,33](for preferred resource) [BOSCH,34] (16)
      * Possibility of having 2nd SCI without TB scheduling [Huawei,1] [Futurewei,2] [Xiaomi,14] [Fraunhofer,15] [Samsung,18] [Sony,24] (6)
      * with scheduling TB containing remaining L2 source/destination ID [LGE,27]
      * Keep Rel-16 SCI format size budget [LGE,27]
    - MAC CE [vivo,5] (for preferred resource) [Fujitsu,6] [Mitsubishi,9] [CEWiT,12] [Intel,21] [DCM,22] [Panasonic,23] [ZTE,26] [LGE,27] [InterDigital,28] [Apple,30](for non-preferred resource) [Qualcomm,33](for non-preferred resource) [BOSCH,34] (13)
      * With the possibility of multiplexing with other data [Intel,21] [Qualcomm,33] [LGE,27] (3)
        + Destination ID are always the same [LGE,27]
        + Destination ID can be different [Intel,21]
      * Without multiplexing with other data [Futurewei,2]
    - PC5-RRC [CEWiT,12] [ZTE,26] [InterDigital,28] [Ericsson,35] (4)
    - Other details
      * Cast type of the signaling
        + Unicast [Huawei,1]
        + Groupcast [Nokia,3]
      * Source ID setting
        + Inter-UE coordination triggered by UE-B’s request

Destination ID of UE-B’s request [LGE,27]

* + - * + Inter-UE coordination triggered without UE-B’s request

Target destination ID to be used for UE-B’s transmission [LGE,27]

* + - * + Request

Source ID to be used for UE-B’s transmission [LGE,27]

* + - * Destination ID setting
        + Inter-UE coordination triggered by UE-B’s request

Broadcast destination ID [Intel,21]

Source ID of UE-B’s request [Intel,21] [LGE,27]

Groupcast destination ID of UE-B [Intel,21]

* + - * + Inter-UE coordination triggered without UE-B’s request

Broadcast destination ID [Intel,21]

(pre)configured ID [LGE,27]

* + - * + Request

Destination ID to be used for UE-B’s transmission [LGE,27]

* + - * Priority value setting
        + Inter-UE coordination triggered by UE-B’s request

Priority value of UE-B’s transmission [Intel,21]

(pre)configured priority value [LGE,27]

* + - * + Inter-UE coordination triggered without UE-B’s request

(pre)configured priority value [Intel,21] [LGE,27]

Highest priority value [Intel,21]

* + - * + Request

(pre)configured priority value [LGE,27]

* + Container of the explicit request in Scheme 1
    - New 2nd-stage SCI format [Huawei,1] [Futurewei,2] [Nokia,3] [vivo,5] [Fujitsu,6] [CATT,10] [CMCC,11] [CAICT,13] [Zhejiang Lab,16] [Samsung,18] [Lenovo,19] [Sony,24] [Apple,30] (13)
      * without TB scheduling [Huawei,1] [Samsung,18]
    - MAC CE [Spreadtrum,4] [vivo,5] [Fujitsu,6] [Fraunhofer,15] [Lenovo,19] [Intel,21] [Panasonic,23] [Sony,24] [ZTE,26] [Apple,30] (10)
      * With the possibility of multiplexing with data [Intel,21]
        + Destination ID are always the same
        + Destination ID can be different [Intel,21]
    - PC5-RRC [CAICT,13] [ZTE,26] [Qualcomm,33] (3)
    - PSFCH [MediaTek,20]
    - Cast type of the signaling
      * Unicast [Huawei,1] [Spreadtrum,4] [Intel,21]
      * Groupcast [Nokia,3]
  + Container of the inter-UE coordination in Scheme 2
    - PSFCH [Huawei,1] [Futurewei,2] [Nokia,3] [vivo,5] [Fujitsu,6] [OPPO,7] [NEC,8] [CATT,10] [CAICT,13] [Xiaomi,14] [Fraunhofer,15] [Zhejiang Lab,16] [Hyundai,17] [Samsung,18] [Lenovo,19] [Intel,21] [DCM,22] [Panasonic,23] [Sony,24] [LGE,27] [InterDigital,28] [Sharp,29] [Apple,30] [ASUSTeK,32] [Qualcomm,33] [Ericsson,35] (26)
      * Set of PSFCH resources
        + Indicated by a separate (pre)configuration

Supported by [vivo,5] [Intel,21] [Ericsson,35] [LGE,27] [Apple,30] [ASUSTeK,32] (6)

* + - * + Unused PSFCH resources with the 0 in the bit string by sl-PSFCH-RB-Set

Supported by [Huawei,1] [Lenovo,19] [Sharp,29] [Qualcomm,33] (4)

* + - * + Different PSFCH resource offset

Supported by [Futurewei,2] [Samsung,18] [Sharp,29] (3)

* + - * + Unused PSFCH resources for SL groupcast HARQ feedback Option 2

Supported by [Nokia,3]

* + - * Base sequence
        + Indicated by a separate (pre)configuration

Supported by [Intel,21]

* + - * + Same as that of SL HARQ-ACK feedback

Supported by [Qualcomm,33]

* + - * Prioritization rule
        + PSFCH TX/TX and TX/RX prioritization rule

Based on priority values of conflicting TBs [Fujitsu,6] [Lenovo,19] [LGE,27] (3)

Rel-16 PSFCH is prioritized over Rel-17 PSFCH [vivo,5]

Based on priority value indicated by UE-B’s SCI and conflict type [Intel,21]

* + - * + PSFCH and UL/LTE SL prioritization rule

Based on priority values of conflicting TBs [Fujitsu,6] [Lenovo,19] [LGE,27] (3)

Reuse the existing prioritization rule [vivo,5]

Based on priority value indicated by UE-B’s SCI and conflict type [Intel,21]

* + - * PSFCH resource determination
        + Timing of the PSFCH transmission

With respect to the time location of the potential conflicted PSSCH resource

Supported by [Futurewei,2] [Spreadtrum,4] [vivo,5] [Intel,21] [DCM,22] [LGE,27] [InterDigital,28] [ASUSTeK,32] (8)

Latest PSFCH slot for Scheme 2 T\_proc,x slots before the resource with resource conflict [Intel,21] [DCM,22] [LGE,27] [ASUSTeK,32] (4)

T\_proc,x is a function of T\_3 and/or T\_prep [Intel,21] [LGE,27]

With respect to the time location of a SCI indicating PSSCH resource with potential resource conflict

Supported by [CATT,10] [Lenovo,19] [Ericsson,35] (3)

* + - * + Frequency and code domain resources derived by

PSCCH/PSSCH resource (sub-channel(s) and slot)

PSCCH/PSSCH resources with resource conflict

Supported by [vivo,5] [Intel,21] [LGE,27] (3)

PSCCH/PSSCH indicated by UE-B’s SCI conveying resource reservation with resource conflict

Supported by [CATT,10] [Lenovo,19] [Ericsson,35] (3)

Source ID of UE-B’s transmission

Supported by [Futurewei,2] [Lenovo,19] [Intel,21] [LGE,27] [Ericsson,35] (5)

Resource conflict type

Supported by [Nokia,3] [Intel,21] [LGE,27] (3)

Priority indicated by UE-B’s SCI

Supported by [ASUSTeK,32]

* + Latency bound for the inter-UE coordination information transmission in Scheme 1
    - PC5-RRC configured [Huawei,1]
    - Pre-determined in higher layer [vivo,5]
    - Indicated by UE-B’s request [LGE,27]
    - UE-B decides whether or not to use inter-UE coordination information based on the aging time [Intel,21]
  + Dedicated resource pool is (pre)configured for inter-UE coordination information transmission in Scheme 1
    - Supported by [Nokia,3] [Qualcomm,33]
* Details on how UE-B uses or skip the received inter-UE coordination in its resource (re)selection
  + Scheme 1 with preferred resource set Option A
    - In resource (re)selection procedure, in which step UE-B uses the inter-UE coordination information
      * After Step 7) (i.e. based on S\_A to be reported to a higher layer in Rel-16 mode 2 RA)
        + Supported by [Huawei,1] [vivo,5] [OPPO,7] [Xiaomi,14] [Fraunhofer,15] [Intel,21] [DCM,22] [LGE,27] [Apple,30] [Ericsson,35] (10)
      * In Step 4) (i.e. based on initial S\_A before applying sensing results)
        + Supported by [CATT,10]
      * In MAC layer procedure
        + Supported by [ZTE,26]
    - Condition when UE-B can use resources not belonging to the preferred resource set
      * The number of resources belonging to the intersection set is smaller than a threshold [Huawei,1] [Fraunhofer,15] [Intel,21] [DCM,22] [LGE,27] [Ericsson,35] (6)
      * The number of preferred resources within UE-B’s resource selection window is smaller than a threshold [LGE,27]
    - UE-B performs resource re-evaluation/pre-emption operation based on the preferred resource set
      * Supported by [Ericsson,35]
    - Skip Step 5) if UE-A has sensing results for non-monitored slots of UE-B [Fujitsu,6] [LGE,27]
  + Scheme 1 with preferred resource set Option B
    - It is applied if UE-B’s transmission is on a TX resource pool (pre)configured with random selection only
      * Supported by [OPPO,7] [DCM,22] [LGE,27] (3)
    - It is applied if UE-B is not capable of performing sensing
      * Supported by [Mitsubishi,9] [DCM,22] [Ericsson,35] (3)
    - It is applied up to UE-B’s implementation [Lenovo,19]
    - UE-B can use resources not belonging to the preferred resource set when a condition is met
      * Supported by [Intel,21] [Apple,30]
      * Details on the condition
        + The number of resources derived by the preferred resource set is smaller than a threshold [Intel,21] [Apple,30]
    - UE-B performs resource re-evaluation/pre-emption operation based on the preferred resource set
      * Supported by [Ericsson,35]
  + Scheme 1 with non-preferred resource set
    - In resource (re)selection procedure, in which step UE-B uses the inter-UE coordination information
      * After Step 7) (i.e. based on S\_A to be reported to a higher layer in Rel-16 Mode 2 RA)
        + Supported by [Huawei,1] [Xiaomi,14] [Intel,21] [DCM,22] [LGE,27] [Apple,30] (6)
      * Before Step 7)
        + Supported by [vivo,5] [OPPO,7] [CATT,10] [CMCC,11] (4)

In Step 6) [vivo,5] [OPPO,7] [CMCC,11]

In Step 4) [CATT,10]

* + - * In MAC layer procedure
        + Supported by [ZTE,26]
    - UE-B can use resources belonging to the non-preferred resource set when a condition is met
      * Supported by [Huawei,1] [Intel,21] [ETRI,25] [Apple,30] (4)
      * Details on the condition
        + The number of final candidate resources is smaller than a threshold [Huawei,1] [Intel,21] [ETRI,25] [Apple,30]
    - UE-B performs resource re-evaluation/pre-emption operation based on the non-preferred resource set
      * Supported by [vivo,5] [Intel,21] [ETRI,25] [Ericsson,35] (4)
  + Validity check for Scheme 1
    - SL-RSRP measurement based on the inter-UE coordination information transmission is larger than a threshold [Fraunhofer,15] [Samsung,18] [Intel,21] [LGE,27] (4)
    - UE-B receives the inter-UE coordination information within latency bound [Samsung,18] [Intel,21] [Apple,30] (3)
    - Destination ID to be used for UE-B’s transmission is matched with source ID of UE-A provided by the inter-UE coordination information [Fraunhofer,15] [Samsung,18] [LGE,27] (3)
    - Distance between UE-A and UE-B is smaller than a threshold [Fraunhofer,15] [Samsung,18] [Intel,21] (3)
    - Minimum time gap between any two selected resources is ensured for a resource pool with PSFCH resource [OPPO,7]
    - Retransmission resource can be indicated by TRIV of a prior SCI [OPPO,7]
    - Source ID of the inter-UE coordination information is matched with UE-B’s request [Intel,21]
    - Priority value used to generate inter-UE coordination information is smaller than that of UE-B’s transmission [Intel,21]
  + Scheme 2
    - Condition when UE-B does not perform re-selection upon the reception of the inter-UE coordination
      * Remaining PDB of UE-B’s transmission is smaller than a threshold [Nokia,3] [Ericsson,35] (2)
      * Priority of UE-B’s transmission is high [Nokia,3]
      * PSFCH resource is not associated with UE-B’s source ID [LGE,27]
      * For Condition 2-A-2, the destination of a PSCCH/PSSCH to be transmitted by UE-B is not UE-A [LGE,27]
    - Skip Step 5) if UE-A informs that there is periodic reservation from other UEs on non-monitored slots of UE-B [Huawei,1]
    - UE-B avoids whole resources in a slot associated with resource conflict [Huawei,1] [vivo,5] [LGE,27] (3)
      * if UE-A informs that resource conflict is determined based on Condition 2-A-2 [Huawei,1] [LGE,27]
    - UE-B avoids resources indicated by its SCI when the resources are associated with resource conflict [vivo,5] [LGE,27] (2)
      * if UE-A informs that resource conflict is determined based on Condition 2-A-1 [LGE,27]
* Details on a (pre)configuration to enable or disable or control feature of the inter-UE coordination
  + (pre)configuration enables or disables Scheme 1 with preferred resource indication, Scheme 1 with non-preferred resource indication, and Scheme 2 in a resource pool independently [Fujitsu,6] [ETRI,25] [ZTE,26] [LGE,27] [Qualcomm,33] (5)
  + (pre)configuration for Scheme 1 indicates whether inter-UE coordination is triggered by an explicit request or without an explicit request in a resource pool [vivo,5] [LGE,27] (2)
  + (pre)configuration indicates priority value(s) of UE-B’s transmission to use Scheme 1 [Lenovo,19] [InterDigital,28] (2)
  + (pre-)configuring which UEs send/receive coordination/trigger information [Huawei,1]
  + (pre)configuration indicates whether UEs request inter-UE coordination information before its transmission or it is up to their decision in a resource pool [Nokia,3]
  + (pre)configuration enables or disables combination(s) of features for inter-UE coordination in a resource pool [Intel,21]
  + (pre)configuration for each scheme enables or disables condition type (e.g. Condition 1-A-1/1-B-1/2-A-1/2-A-2) for generating inter-UE coordination information [LGE,27]
* Details on a condition to trigger inter-UE coordination information in Scheme 1
  + Condition(s) when UE-A transmits the inter-UE coordination information to UE-B
    - Potential/expected resource conflict is detected on the resources reserved by UE-B [OPPO,7] [NEC,8] [Xiaomi,14] [Fraunhofer,15] [Ericsson,35] (6)
    - Up to UE’s decision in higher layer [Futurewei,2] [LGE,27] [Apple,30] (3)
    - Change in resource to be sent via inter-UE coordination [Nokia,3] [MediaTek,20] (2)
    - Reception at an intended destination UE of an SCI indicating reserved resources for its reception [Nokia,3] [Qualcomm,33] (2)
    - Number of failure of TB decoding at UE-A side is larger than a threshold [Lenovo,19] [Sony,24] (2)
    - UE-A completes its resource selection to reserve its initial transmission before indicating it [Qualcomm,33] [Ericsson,35] (2)
    - UE-A transmits CSI request and wait UE-B’s response [Nokia,3]
    - RSRP measurement of the received SCI is higher than a threshold [CMCC,11]
    - Distance between UE-A and other UE is smaller than a threshold and the distance between UE-B and other UE is higher than a threshold [CMCC,11]
    - Distance between UE-A and UE-B is smaller than a threshold [Xiaomi,14]
    - Distance between UE-A and UE-B is larger than a threshold [Xiaomi,14]
    - Feedback was not transmitted for a certain amount of time [Intel,21]
    - UE has data for intended sidelink transmission which is multiplexed with feedback payload [Intel,21]
    - CBR is higher than a threshold [Apple,30]
    - Periodic timer expires at UE-A side [Ericsson,35]
  + Condition(s) when UE-B transmits the request for the inter-UE coordination information
    - Resource re-selection is triggered [OPPO,7] [Xiaomi,14] [Intel,21] (3)
    - Up to UE’s decision in higher layer [ZTE,26] [LGE,27] (2)
    - TB arrives at UE-B side [vivo,5]
    - Number of NACK received by UE-B is higher than a threshold [NEC,8]
    - UE-B has data/TB for transmission that can be multiplexed with request [Intel,21]
    - UE-B does not have valid inter-UE coordination information [Intel,21]
    - Elapsed time from the previous inter-UE coordination feedback request exceeds pre-configured value [Intel,21]
    - Re-selection counter is equal to zero [Ericsson,35]
* Condition(s)/scenario(s) under which each information is enabled to be sent by UE-A and used by UE-B
  + Further restriction on combination(s) of features of the inter-UE coordination
    - Preferred resource set + triggered by an explicit request [Fujitsu,6] [Xiaomi,14] [Fraunhofer,15] [Zhejiang Lab,16] [Samsung,18] [DCM,22] [ZTE,26] [LGE,27] [Intel,21] [Apple,30] (10)
    - Non-preferred resource set + triggered without an explicit request [Fujitsu,6] [Xiaomi,14] [Fraunhofer,15] [DCM,22] [LGE,27] [Apple,30] (6)
    - Non-preferred resource set + triggered by an explicit request [Xiaomi,14] [Fraunhofer,15] [Samsung,18] [ZTE,26] [Intel,21] [Apple,30] (6)
    - All combinations [Futurewei,2] [Sony,24] [Sharp,29] (3)
  + UE-A determines whether to transmit preferred resource set or non-preferred resource set based on CBR measured in UE-A [Nokia,3]
* Additional condition(s) on being UE-A and UE-B
  + Inter-UE coordination information triggered by an explicit request in Scheme 1
    - UE-A is an only destination of a TB transmitted by UE-B
      * Supported by [CATT,10] [Samsung,18] [DCM,22] [ETRI,25] [InterDigital,28] [Qualcomm,33](for preferred resource set) [Ericsson,35] (7)
    - A non-destination UE of a TB transmitted by UE-B can be UE-A
      * Supported by [Huawei,1] [Spreadtrum,4] [Lenovo,19] [Sony,24] (4)
    - Pre-determined by higher layer
      * Supported by [Huawei,1] [vivo,5] [Fraunhofer,15] (3)
    - Priority of UE-B’s transmission is smaller than a threshold
      * Supported by [OPPO,7]
    - Remaining PDB of UE-B’s transmission is larger than a threshold
      * Supported by [OPPO,7]
    - Distance between UE-A and UE-B is within a range [Mitsubishi,9]
  + Inter-UE coordination information triggered without an explicit request in Scheme 1
    - UE-A is an only destination of a TB transmitted by UE-B
      * Supported by [Mitsubishi,9] [CATT,10] [Samsung,18] [ETRI,25] [InterDigital,28] [Ericsson,35] (6)
    - Pre-determined by higher layer
      * Supported by [Huawei,1] [vivo,5] [Fraunhofer,15] (3)
    - Any UE performing resource reservation can be UE-A, and any UE performing unicast transmission to UE-A can be UE-B
      * Supported by [vivo,5]
    - Priority of UE-B’s transmission is smaller than a threshold
      * Supported by [OPPO,7]
    - Remaining PDB of UE-B’s transmission is larger than a threshold
      * Supported by [OPPO,7]
    - Distance between UE-A and UE-B is within a range
      * Supported by [Mitsubishi,9]
  + Scheme 2
    - UE-B is a UE transiting a TB with lower or equal priority value among the conflicting TBs
      * Supported by [Intel,21] [DCM,22] [InterDigital,28] [Qualcomm,33] (4)
    - UE-A is an only destination of a TB transmitted by UE-B
      * Supported by [vivo,5] [Samsung,18] [ZTE,26] (3)
    - Any UE that detects the corresponding triggering condition (i.e., an expected/potential conflict) transmits the coordination message and is a UE-A
      * Supported by [Fraunhofer,15] [Ericsson,35] (2)
    - If UE-A is not a destination of TB transmitted by UE-B, a (pre)configuration indicates density and/or distance dependent probability to be UE-A
      * Supported by [Nokia,3]
* Additional feature
  + Presence of detected resource conflict on resource(s) indicated by UE-B’s SCI
    - Supported by [Nokia,3] [Fujitsu,6] [Fraunhofer,15] [Lenovo,19] [Intel,21] [ETRI,25] [BOSCH,34] (7)
    - Objected by [Huawei,1] [Mitsubishi,9] [CATT,10] [CMCC,11] [Samsung,18] [InterDigital,28] [Sharp,29] (7)
* Additional condition(s) to determine inter-UE coordination information
  + Condition 1-A-2
    - Supported by [Huawei,1] [Futurewei,2] [Spreadtrum,4] [OPPO,7] [Mitsubishi,9] [Fraunhofer,15] [Samsung,18] [Lenovo,19] [Intel,21] [DCM,22] [Panasonic,23] [ETRI,25] (12)
  + Condition 1-A-3
    - Supported by [OPPO,7] [Samsung,18] [Spreadtrum,4] [CMCC,11] [Fraunhofer,15] (5)
  + Condition 1-B-2
    - Supported by [Huawei,1] [Futurewei,2] [Spreadtrum,4] [vivo,5] [OPPO,7] [Mitsubishi,9] [CATT,10] [CMCC,11] [Fraunhofer,15] [Samsung,18] [Lenovo,19] [Intel,21] [DCM,22] [Panasonic,23] [ETRI,25] [LGE,27] [Apple,30] (17)
  + Condition 1-B-3: Resources for a selected but not reserved transmission of UE-A
    - Supported by [Fujitsu,6] [Qualcomm,33] (2)
  + Condition 1-A-4: Resources excluding those overlapping with preferred resources from other UE-A
    - Supported by [Nokia,3]
  + Condition 1-A-5: Resource(s) excluding slot(s) where UE-A cannot monitor
    - Supported by [Spreadtrum,4]
  + Condition 2-A-3: UE-A identifies that both source and destination UEs have transmitted in the same slot on non-overlapped frequency resources
    - Supported by [Intel,21]
  + Condition 2-A-4: UE-A identifies that both source and destination UEs have reserved resource on non-overlapped frequency resources
    - Supported by [Intel,21]
* Others
  + Further consideration on how to handle resource conflict on reserved resources of multiple UE-Bs [vivo,5] [OPPO,7] (2)
  + Further consideration on how to handle the case when UE-B receives inter-UE coordination information from multiple UE-As [Fujitsu,6] [Samsung,18] (2)
  + Further consideration of indication to UE-A of ID(s) used by UE-B and the intended receiver(s) of UE-B’s transmission [Nokia,3]
  + Further consideration on how to select resource for coordination information transmission, i.e., jointly with the recommended resources, or independently [vivo,5]
  + Further consideration on a single signaling to transmit one or multiple set of resources is transmitted by UE-A to multiple UE-Bs [OPPO,7]
  + Further consideration on how to use different type of resource set in resource (re)selection procedure [Intel,21]
  + Further consideration on the possibility of that UE with and without inter-UE coordination coexist in the same resource pool [Panasonic,23]
  + Further consideration of repetition of inter-UE coordination information transmission [BOSCH,34]
  + Further consideration on a single signaling to transmit the sets of preferred, non-preferred and remaining resources using different RSRP thresholds [Ericsson,35]
  + Further consideration on the possibility of that UE performs sensing for retransmission when initial transmission derived by Option B frame work is not successful [Ericsson,35]
  + Further consideration on that Scheme 2 is supported for UE with no sensing [Ericsson,35]

1. **Reference**
2. R1-2108764 Inter-UE coordination in sidelink resource allocation Huawei, HiSilicon
3. R1-2108801 Discussion on techniques for inter-UE coordination FUTUREWEI
4. R1-2108819 Inter-UE coordination for Mode 2 enhancements Nokia, Nokia Shanghai Bell
5. R1-2108925 Discussion on inter-UE coordination in sidelink resource allocation Spreadtrum Communications
6. R1-2108999 Discussion on mode-2 enhancements vivo
7. R1-2109037 Considerations on inter-UE coordination for mode 2 enhancements Fujitsu
8. R1-2109060 Inter-UE coordination in mode 2 of NR sidelink OPPO
9. R1-2109130 Discussion on mode 2 enhancements NEC
10. R1-2109142 Inter-UE coordination for enhanced resource allocation Mitsubishi Electric RCE
11. R1-2109192 Discussion on Inter-UE coordination for Mode 2 enhancements CATT, GOHIGH
12. R1-2109301 Discussion on inter-UE coordination for mode 2 enhancement CMCC
13. R1-2109341 Feasibility and benefits for NR Sidelink mode 2 enhancements CEWiT
14. R1-2109349 Considerations on mode 2 enhancements CAICT
15. R1-2109385 Discussion on inter-UE coordination Xiaomi
16. R1-2109431 Resource Allocation Enhancements for Mode 2 Fraunhofer HHI, Fraunhofer IIS
17. R1-2109449 Discussion on inter-UE coordination for mode 2 enhancements Zhejiang Lab
18. R1-2109450 Discussion on inter-UE coordination for Mode 2 enhancements Hyundai Motors
19. R1-2109513 On Inter-UE Coordination for Mode2 Enhancements Samsung
20. R1-2109542 Inter-UE coordination for Mode 2 enhancements Lenovo, Motorola Mobility
21. R1-2109586 Discussion on Mode 2 enhancements MediaTek Inc.
22. R1-2109632 Solutions for sidelink communication with inter-UE coordination feedback Intel Corporation
23. R1-2109700 Resource allocation for reliability and latency enhancements NTT DOCOMO, INC.
24. R1-2109758 Inter-UE coordination for Mode 2 enhancements Panasonic Corporation
25. R1-2109801 Discussion on inter-UE coordination for Mode 2 enhancements Sony
26. R1-2109819 Discussion on inter-UE coordination for Mode 2 enhancements ETRI
27. R1-2109852 Discussion on inter-UE coordination ZTE
28. R1-2109861 Discussion on inter-UE coordination for Mode 2 enhancements LG Electronics
29. R1-2109884 On inter-UE coordination for Mode 2 enhancement InterDigital, Inc.
30. R1-2110006 Discussion on inter-UE coordination for mode 2 enhancements Sharp
31. R1-2110054 On Inter-UE Coordination Apple
32. R1-2110117 Discussion on Inter-UE Coordination for NR SL Mode 2 Enhancement Convida Wireless
33. R1-2110132 Discussion on V2X mode 2 enhancements ASUSTeK
34. R1-2110209 Reliability and Latency Enhancements for Mode 2 Qualcomm Incorporated
35. R1-2110306 Support of inter-UE coordination scheme 1 and scheme 2 ROBERT BOSCH GmbH
36. R1-2110340 Details on mode 2 enhancements for inter-UE coordination Ericsson
37. **Appendix**

**5.1 Conclusions made in RAN1#103-e meeting**

* ***Conclusion****:*
  + *The schemes of inter-UE coordination in Mode 2 are categorized as being based on the following types of “A set of resources” sent by UE-A to UE-B:*
    - *UE-A sends to UE-B the set of resources preferred for UE-B’s transmission*
      * + *e.g., based on its sensing result*
    - *UE-A sends to UE-B the set of resources not preferred for UE-B’s transmission*
      * + *e.g., based on its sensing result and/or expected/potential resource conflict*
    - *UE-A sends to UE-B the set of resource where the resource conflict is detected*
    - *FFS: details of resource conflict, e.g., including type of resource conflict*
    - *FFS: details of sensing operation at UE-A side*
    - *FFS: which type(s) of resource set information is(are) beneficial/feasible to which cast type(s)*
    - *Note: these different types may be used in combination with each other*
  + *From RAN1 perspective, further study on the feasibility/benefit of inter-UE coordination is required*
  + *Send an LS to RAN plenary*
    - *Final LS in R1-2009841*
* ***Conclusion****:*
  + *For the schemes of inter-UE coordination identified as feasible/beneficial, at least the following aspects are further discussed.*
    - *How/when UE-A determines the contents of ”A set of resources”, including consideration of UL scheduling*
    - *When UE-A sends ”A set of resources” to UE-B, including which UE(s) sends it*
    - *How UE-A and UE-B are determined*
    - *How UE-A sends ”A set of resources” to UE-B, including container used for carrying it, implicitly or explicitly or both*
    - *How/when/whether UE-B receives “A set of resources” and takes it into account in the resource selection for its own transmission*
    - *How/whether to define the relationship between support/signaling of inter-UE coordination and cast type*

**5.2 Conclusions made in RAN1#104-e meeting**

* ***Conclusion****:*
  + *RAN1 concludes that the inter-UE coordination in Mode 2 is feasible, and is beneficial (e.g., reliability, etc.) compared to Rel-16 Mode 2 RA, and thus recommends specification of the feature.*
    - *The detailed observations can be found in the attachment of the LS*
* *Draft LS in R1-2102165, along with the attachment R1-2102166, is approved (with a typo fix)* 
  + *Final LS in R1-2102168*

**5.3 Agreements made in RAN1#104bis-e meeting**

* *Agreement:*
  + *Support the following schemes of inter-UE coordination in Mode 2:*
    - *Inter-UE Coordination Scheme 1:* 
      * *The coordination information sent from UE-A to UE-B is the set of resources preferred and/or non-preferred for UE-B’s transmission*
        + *FFS details including a possibility of down-selection between the preferred resource set and the non-preferred resource set, whether or not to include any additional information other than indicating time/frequency of the resources within the set in the coordination information*
      * *FFS condition(s) in which Scheme 1 is used*
    - *Inter-UE Coordination Scheme 2:* 
      * *The coordination information sent from UE-A to UE-B is the presence of expected/potential and/or detected resource conflict on the resources indicated by UE-B’s SCI*
        + *FFS details including a possibility of down-selection between the expected/potential conflict and the detected resource conflict*
      * *FFS condition(s) in which Scheme 2 is used*
* *Agreement:*
  + *Study further to determine the conditions for UEs to be UE-A(s)/UE-B(s) for inter-UE coordination:*
    - *Details include applicable scenario(s)/inter-UE coordination scheme(s)*
    - *E.g., only UE(s) among the intended receiver(s) of UE-B can be a UE-A, any UE can be a UE-A, high-layer configured, etc.*
      * *Including the possibility of being subject to certain conditions and/or capability*
* *Agreement:*
  + *When UE-B receives the inter-UE coordination information from UE-A, consider at least one of the following options (with details FFS including possibly down-selecting/merging one or more of the options below, applicable scenario(s)/condition(s) for each option, UE behavior) for UE-B’s to take it into account in the resource (re)-selection for its own transmission*
    - *For scheme 1:*
      * *Option 1-1: UE-B’s resource(s) to be used for its transmission resource (re)-selection is based on both UE-B’s sensing result (if available) and the received coordination information*
      * *Option 1-2: UE-B’s resource(s) to be used for its transmission resource (re)-selection is based only on the received coordination information*
      * *Option 1-3: UE-B’s resource(s) to be re-selected based on the received coordination information*
      * *Option 1-4: UE-B’s resource(s) to be used for its transmission resource (re)-selection is based on the received coordination information*
    - *For scheme 2:*
      * *Option 2-1: UE-B can determine resource(s) to be re-selected based on the received coordination information*
      * *Option 2-2: UE-B can determine a necessity of retransmission based on the received coordination information*

**5.4 Agreements made in RAN1#106-e meeting**

* *Agreement:*
  + *For scheme 1, the following inter-UE coordination information signalling from UE-A is supported. FFS details including condition(s)/scenario(s) under which each information is enabled to be sent by UE-A and used by UE-B.*
    - *Set of resources preferred for UE-B’s transmission*
    - *Set of resources non-preferred for UE-B’s transmission*
* *Agreement:*
  + *For scheme 2, the following inter-UE coordination information signalling from UE-A is supported. FFS details including condition(s)/scenario(s) under which each information is enabled to be sent by UE-A and used by UE-B*
    - *Presence of expected/potential resource conflict on the resources indicated by UE-B’s SCI*
      * *FFS: UE behaviour when the presence of expected/potential resource conflict is detected by the transmitter*
    - *FFS: Whether to additionally support the presence of detected resource conflict on the resources indicated by UE-B’s SCI*
* *Agreement:*
  + *In scheme 1, the following is supported for UE(s) to be UE-A(s)/UE-B(s) in the inter-UE coordination information transmission triggered by an explicit request in Mode 2:*
    - *A UE that sends an explicit request for inter-UE coordination information can be UE-B*
    - *A UE that received an explicit request from UE-B and sends inter-UE coordination information to the UE-B can be UE-A*
    - *(Working assumption) At least a destination UE of a TB transmitted by UE-B can be UE A*
    - *The above feature can be enabled or disabled or controlled by (pre-)configuration*
      * *FFS: Details on how to support this, including (pre-)configuration signaling granularity*
    - *FFS: Additional details and conditions on UE-A and UE-B*
  + *(Working Assumption) In scheme 1, the following is supported for UE(s) to be UE-A(s)/UE-B(s) in the inter-UE coordination information transmission triggered by a condition other than explicit request reception in Mode 2:*
    - *A UE that satisfies the condition mentioned in the main bullet and sends inter-UE coordination information is UE-A*
    - *A UE that received inter-UE coordination information from UE-A and uses it for resource (re-)selection is UE-B*
    - *The above feature can be enabled or disabled or controlled by (pre-)configuration*
      * *FFS: Details on how to support this, including (pre-)configuration signaling granularity*
    - *FFS: Additional details and conditions on UE-A and UE-B*
* *Agreement:*
  + *In scheme 2, at least the following is supported for UE(s) to be UE-A(s)/UE-B(s) in the inter-UE coordination transmission triggered by a detection of expected/potential resource conflict(s) in Mode 2:*
    - *A UE that transmitted PSCCH/PSSCH with SCI indicating reserved resource(s) to be used for its transmission, received inter-UE coordination information from UE-A indicating expected/potential resource conflict(s) for the reserved resource(s), and uses it to determine resource re-selection is UE-B*
    - *A UE that detects expected/potential resource conflict(s) on resource(s) indicated by UE-B’s SCI sends inter-UE coordination information to UE-B, subject to satisfy one of the following conditions, is UE-A*
      * *(Working assumption) At least a destination UE of one of the conflicting TBs, i.e., TBs to be transmitted in the expected/potential conflicting resource(s)*
        + *Whether a non-destination UE of a TB transmitted by UE-B can be UE-A is (pre-)configured*
      * *FFS: Additional details and condition(s) on UE-A and UE-B*
    - *The above feature can be enabled or disabled or controlled by (pre-)configuration*
      * *FFS: Details on how to support this, including (pre-)configuration signaling granularity*
    - *FFS: Definition of expected/potential resource conflict(s) and other details (if any)*
* *Agreement:*
  + *In scheme 2, the following UE-B’s behavior in its resource (re)selection is supported when it receives inter-UE coordination information from UE-A:*
    - *UE-B can determine resource(s) to be re-selected based on the received coordination information*
      * *UE-B can reselect resource(s) reserved for its transmission when expected/potential resource conflict on the resource(s) is indicated*
        + *FFS: Other details (if any)*
* *Agreement:*
  + *In scheme 1, at least following UE-B’s behavior in its resource (re-)selection is supported when it receives inter-UE coordination information from UE-A:*
    - *For preferred resource set, the following two options are supported:*
      * *Option A): UE-B’s resource(s) to be used for its transmission resource (re-)selection is based on both UE-B’s sensing result (if available) and the received coordination information*
        + *UE-B uses in its resource (re-)selection, resource(s) belonging to the preferred resource set in combination with its own sensing result*

*UE-B uses in its resource (re-)selection, resource(s) not belonging to the preferred resource set when condition(s) are met*

*FFS: Details of condition(s)*

*This option is supported when UE-B performs sensing/resource exclusion*

*FFS: Other details (if any)*

* + - * *Option B): UE-B’s resource(s) to be used for its transmission resource (re-)selection is based only on the received coordination information*
        + *UE-B uses in its resource (re-)selection, resource(s) belonging to the preferred resource set*

*This option is supported at least when UE-B does not support sensing/resource exclusion*

*FFS: Whether the support is conditional or UE capability*

*FFS: Other details (if any)*

* + - * *FFS: Other option(s), and other details (if any)*
    - *For non-preferred resource set,* 
      * *UE-B’s resource(s) to be used for its transmission resource (re-)selection is based on both UE-B’s sensing result (if available) and the received coordination information* 
        + *UE-B excludes in its resource (re-)selection, resource(s) overlapping with the non-preferred resource set*

*FFS: Details including*

*Whether/how UE-B can use in its resource (re-)selection, resource(s) overlapping with the non-preferred resource set, definition of the overlap, and other details (if any)*

*When UE-B excludes in its resource (re-)selection, resource(s) overlapping with the non-preferred resource set*

* + - * + *FFS: UE-B reselects in its resource (re-)selection, resource(s) to be used for its transmission when the resource(s) are fully/partially overlapping with the non-preferred resource set*
      * *FFS: Other option(s), and other details (if any)*
* *Agreement:*
  + *In scheme 2, at least the following is supported to determine inter-UE coordination information:*
    - *Among resource(s) indicated by UE-B’s SCI, UE-A considers that expected/potential resource conflict occurs on the resource(s) satisfying at least one of the following condition(s):* 
      * *Condition 2-A-1:*
        + *Other UE’s reserved resource(s) identified by UE-A are fully/partially overlapping with resource(s) indicated by UE-B’s SCI in time-and-frequency*
        + *FFS: Other details (if any)*
        + *FFS: Whether/how to specify additional criteria and other details (if any) including signaling details of conflict indication*
      * *(Working Assumption) Condition 2-A-2:* 
        + *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation*

*FFS: Other details (if any)*

* + - * *FFS: Other condition(s)*
    - *FFS: Other details (if any)*
* *Agreement:*
  + *In scheme 1, at least the following is supported to determine inter-UE coordination information of preferred resource set:*
    - *UE-A considers any resource(s) satisfying all the following condition(s) as set of resource(s) preferred for UE-B’s transmission*
      * *Condition 1-A-1:*
        + *Resource(s) excluding those overlapping with reserved resource(s) of other UE identified by UE-A whose RSRP measurement is larger than a RSRP threshold*

*FFS: Other details (if any)*

* + - * *FFS: Condition 1-A-2:*
        + *Resource(s) excluding slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*

*FFS: Other details (if any)*

* + - * *FFS: Condition 1-A-3:*
        + *Resource(s) satisfying UE-B’s traffic requirement (if available)*

*FFS: Other details (if any)*

* + - * *FFS: Other condition(s)*
    - *FFS: Other details (if any)*
* *Agreement:* 
  + *In scheme 1, at least the following is supported to determine inter-UE coordination information of non-preferred resource set:*
    - *UE-A considers any resource(s) satisfying at least one of the following condition(s) as set of resource(s) non-preferred for UE-B’s transmission*
      * *Condition 1-B-1:*
        + *Reserved resource(s) of other UE identified by UE-A from other UEs’ SCI (including priority field) and RSRP measurement*

*FFS: Other details (if any)*

* + - * *FFS: Condition 1-B-2:*
        + *Resource(s) (e.g., slot(s)) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B*

*FFS: Other details (if any)*

* + - * *FFS: Other condition(s)*
    - *FFS: Other details (if any)*

**5.5 Agreements made in RAN1#106bis-e meeting**

* *Agreement:* 
  + *For Scheme 2, PSFCH format 0 is used to convey the presence of expected/potential resource conflict on reserved resource(s) indicated by UE-B’s SCI*
* *Agreement:* 
  + *For Condition 2-A-1 of Scheme 2, down-select one or more of following additional criteria to determine resource(s) where expected/potential resource conflict occurs*
    - *Option 1: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a RSRP threshold according to the priorities included in the SCI:*
      * *prio\_TX and prio\_RX are the priorities indicated in the SCI making the overlapping reservations*
      * *Strive to reuse Rel-16 specification wherever possible*
    - *Option 2: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is within a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.* 
      * *FFS: Whether the threshold depends on priority*
    - *Option 3: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) and the other UE is within a distance threshold of UE-B as determined by both UEs’ SCIs.*
    - *Option 4: The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) whose RSRP measurement is larger than a (pre)configured RSRP threshold compared to the RSRP measurement of UE-B’s reserved resource.* 
      * *FFS: Whether the threshold depends on priority*
    - *FFS: In case of collisions of resources for two UEs having TBs with UE A as destination UE, if needed*