**3GPP TSG RAN WG1 Meeting #107-e R1-** **211xxxx**

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

**Agenda item:** 8.11

**Source:** Moderator (LG Electronics)

**Title:** [107-e-R17-RRC-Sidelink] Summary of email discussion on Rel-17 RRC parameters for sidelink enhancement

**Document for:** Discussion and information

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

At the last meeting, since the following parameters were tagged with ‘unstable’, additional discussion is necessary to resolve their remaining details.

* Tagged with ‘unstable’
  + additionalPeriodicSensingOccasion
  + condition1A2Scheme1Disabled
  + thresRSRPCondition1B1Option1Scheme1
  + thresRSRPCondition1B1Option2Scheme1

Also even though the following RRC parameters were tagged with ‘stable’ at the last meeting and additional discussion is still needed to resolve their remaining details. Note that since the value range of interUECoordinationScheme1 is being discussed in [107-e-NR-R17-Sidelink-02], they are excluded from this email discussion. From FL’s perspective, after a decision on the value range of interUECoordinationScheme is made, it would be better to discuss other FFS points of interUECoordinationScheme1.

* Tagged with ‘stable’ (Note that only these parameters were included in the LS sent to RAN2)
  + minNumCandidateSlots
  + contiguousSensingWindowPeriodic
  + interUECoordinationScheme1
  + interUECoordinationScheme2

Furthermore, at the last meeting, the RRC parameter related to the contents marked in cyan on the working assumption below was proposed to be defined during the email discussion of [106bis-e-R17-RRC-Sidelink], but it was not finally included in the excel sheet because there was a comment that more discussions/decisions on its details are needed before defining the relevant RRC parameter. So, additional discussion is needed to define this RRC parameter.

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| * *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)* |

**1.1 IE of additionalPeriodicSensingOccasion**

**Question 1**: Which option do you prefer? Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

* Option 1:

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| additionalPeriodicSensingOccasion | New | additionalPeriodicSensingOccasion | Indicates that UE additionally monitors periodic sensing occasions that correspond to a set of values. | Monitored |  | Per resource pool | UE-specific or Cell-specific | 38.331 | If the value is not present, the UE monitors only the most recent sensing occasion.  {See the memo on the right for the relevant agreements} |

* Option 2:

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| additionalPeriodicSensingOccasion | New | additionalPeriodicSensingOccasion | Indicates that UE additionally monitors periodic sensing occasions that correspond to a set of values. Possible values in the set includes the most recent sensing occasion and the last periodic sensing occasion prior to the most recent one for all configured reservation periodicities in periodicSensingOccasionReservePeriodList. If not configured, the UE monitors the most recent sensing occasion for all configured reservation periodicities in periodicSensingOccasionReservePeriodList. | Monitored; not monitored |  | Per resource pool | UE-specific or Cell-specific | 38.331 | In the value range, ‘monitored’ means that both the most recent sensing occasion and the last periodic sensing occasion prior to the most recent one to be monitored by the UE is configured, and ‘not monitored’ means that the UE monitors only the most recent sensing occasion. If the value is not present, the UE monitors only the most recent sensing occasion.  {See the memo on the right for the relevant agreements} |

* Option 3: Others (please specify it)

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| **Company** | **Option(s)** | **Comment** |
| LGE | Option 1 | The agreement starts with “if (pre)configured”. In this case, if this parameter is not (pre)configured, default behaviour will be used in our understanding. |
| Ericsson | Option 1 | It is the simplest solution. |
| Huawei, Hisilicon | Option 1 | No need to repeat phy layer procedure text in here. Save that debate for the editor CR phase. |
| Samsung | Option 2 | We believe that this parameter can be (re-)configured to monitored or not-monitored. The default value per the agreement is not-monitored, when the parameter is absent from the configuration. |
| OPPO | Option 1 | It is the simplest and the cleanest. |

**1.2 IE of condition1A2Scheme1Disabled**

**Question 2**: Companies provide their views of how the fields of ‘Default value aspect’, ‘Per (UE, cell, TRP, …)’ and ‘UE-specific or Cell-specific’ should be defined. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| [condition1A2Scheme1Disabled] | New | [condition1A2Scheme1Disabled] | Indicates disabling the use of condition of excluding from preferred resource set resource(s) in 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. | Disabled | FFS | FFS | FFS | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Comment** |
| LGE | Condition 1-A-2 is enabled | Per resource pool | UE-specific or cell-specific | Features of inter-UE coordination information can be (pre)configured per resource pool. To differentiate them across UEs, UE-A and UE-B should be PC5-RRC connected. |
| Ericsson | See comment | Per resource pool | UE specific | We are not sure that discussing ‘default value aspect’ makes a lot of sense. There is only one value in value range, so that will be the default value. That should not be confused with the feature being ‘disabled’ by default. If no configuration is provided, the feature is indeed enabled.  We think the description should be improved, see our last comment. |
| Huawei, Hisilicon | If not configured, 1A2 is enabled. | Per resource pool | UE-specific or cell-specific | There is no default value; the IE is either present or absent. |
| Samsung | Enabled | Per resource pool | UE-specific or cell-specific |  |
| OPPO |  | Per resource pool | UE-specific, cell-specific | There is only one value, default value is not needed. When the configuration is absent, the condition is enabled. |

**1.3 IE of thresRSRPCondition1B1Option1Scheme1**

**Question 3**: Companies provide their views of how the fields of ‘Default value aspect’, ‘Per (UE, cell, TRP, …)’ and ‘UE-specific or Cell-specific’ should be defined and whether the square bracket of ‘Value range’ can be removed. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| [thresRSRPCondition1B1Option1Scheme1] | New | [thresRSRPCondition1B1Option1Scheme1] | Indicates the RSRP threshold used to determine reserved resource(s) of other UE(s) identified by UE-A whose RSRP measurement is larger than it as set of resource(s) non-preferred for UE-B’s transmission, and the threshold is selected based on the priority in the decoded SCI of the UE(s). | [One of {minus infinity dBm, -128dBm, -126dBm, -124dBm,…, -4Bm, -2dBm, 0dBm, infinity dBm} per priority value] | FFS | FFS | FFS | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Yes/no for removing the square bracket of Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Comment** |
| LGE | Yes | Infinity | Per resource pool | UE-specific or cell-specific | To enable this sub-condition, the RSRP threshold should be (pre)configured. Otherwise, this sub-condition can be disabled. |
| Ericsson | Yes, see comment | Infinity | Per resource pool | UE-specific | There is a typo in the value range. It should read 4dBm and not 4Bm  We think the description should be improved, see our last comment. |
| Huawei, HiSilicon | Yes | No need to have default value. | Per resource pool | UE-specific or cell-specific | The default value is not needed, and is not supported by any agreement. |
| Samsung | Yes | N/A | Per resource pool | UE-specific or cell-specific | No default value, always configured. |
| OPPO | NO | Infinity or no default value | Per resource pool | UE-specific, cell-specific | Minus infinity should be removed from the value range. |

**1.4 IE of thresRSRPCondition1B1Option2Scheme1**

**Question 4**: Companies provide their views of how the fields of ‘Default value aspect’, ‘Per (UE, cell, TRP, …)’ and ‘UE-specific or Cell-specific’ should be defined and whether the square bracket of ‘Value range’ can be removed. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| [thresRSRPCondition1B1Option2Scheme1] | New | [thresRSRPCondition1B1Option2Scheme1] | Indicates the RSRP threshold used to determine reserved resource(s) of other UE(s) identified by UE-A whose RSRP measurement is smaller than it as set of resource(s) non-preferred for UE-B’s transmission when UE-A is a destination of a TB transmitted by the UE(s), and the threshold is selected based on the priority in the decoded SCI of the UE(s). | [One of {minus infinity dBm, -128dBm, -126dBm, -124dBm,…, -4Bm, -2dBm, 0dBm, infinity dBm} per priority value] | FFS | FFS | FFS | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Yes/no for removing the square bracket of Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Comment** |
| LGE | Yes | Minus Infinity | Per resource pool | UE-specific or cell-specific | To enable this sub-condition, the RSRP threshold should be (pre)configured. Otherwise, this sub-condition can be disabled. |
| Ericsson | Yes, see comment | Minus infinity | Per resource pool | UE-specific | There is a typo in the value range. It should read 4dBm and not 4Bm.  We think the description should be improved, see our last comment. |
| Huawei, HiSilicon | Yes | No need to have default value. | Per resource pool | UE-specific or cell-specific | The default value is not needed, and is not supported by any agreement. |
| Samsung | Yes | N/A | Per Resource Pool | UE-specific or cell-specific | No default value, always configured. |
| OPPO | NO | Minus infinity or no default value | Per resource pool | UE-specific, cell-specific | Infinity should be removed from the value range. |

**1.5 IE of interUECoordinationScheme2**

**Question 5**: Companies provide their views of how the fields of ‘Value range', ‘Default value aspect’, ‘Per (UE, cell, TRP, …)’ and ‘UE-specific or Cell-specific’ should be defined. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| interUECoordinationScheme2 | New | interUECoordinationScheme2 | Use of inter-UE coordination scheme 2 is enabled/disabled/controlled by this parameter. | TBD | FFS | FFS | FFS | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Comment** |
| LGE | Enabled | disabled | Per resource pool | UE-specific or cell-specific | In our understanding, whether or not non-destination UE can be UE-A is controlled by another parameter. |
| Ericsson | Enabled |  | Per resource pool | UE-specific | We are not sure that discussing ‘default value aspect’ makes a lot of sense. There is only one value in value range, so that will be the default value. That should not be confused with the feature being ‘enabled’ or ‘disabled’ by default. |
| Huawei, HiSilicon | Enabled | If not present, scheme 2 is disabled | Per resource pool | UE-specific or cell-specific | IE is a flag, either present or absent, so does not have a default value in ASN.1 |
| Samsung | {Disable, UE\_A, UE\_B, UE\_AB}  {Disabled, Enabled} | Disabled  Disabled | Per UE  Per resource pool | UE specific  Cell specific | Split into two parameters: First parameter is UE specific  Second parameter is cell specific |
| OPPO | Enabled |  | Per resource pool | UE-specificy, cell-specific | There is only one value, default value is not needed. |

**1.6 IE of contiguousSensingWindowPeriodic**

**Question 6**: Companies provide their views of how the field of ‘Value range' should be defined and whether the square bracket of ‘Per (UE, cell, TRP, …)’ can be removed. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| contiguousSensingWindowPeriodic | New | contiguousSensingWindowPeriodic | Parameter that indicates the size of contiguous partial sensing window in logical slot units for a resource (re)selection procedure triggered by periodic transmission. If not configured, the size of contiguous partial sensing window in logical slot units is 31. | [[TBD]… 30] |  | [Per resource pool] | UE-specific or Cell-specific | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Value range** | **Yes/no for removing the square bracket of Per (UE, cell, TRP, …)** | **Comment** |
| LGE | 4 | Yes | The range of T\_proc,1+T\_proc,0 is from 4 to 21. For simplicity, we suggest to minimum value of M is 4. In this case, n+T\_A equals to n+T\_B. |
| Ericsson | Value range [TBD, … 30] | Yes | For the value range, the contiguous Sensing window value should go between 0 for the case when contiguous partial sensing is not performed due to some constraints (this is currently being discussed in the power saving agenda item) and the value of 30 as upper bound. |
| Huawei, HiSilicon | 5…30 | Yes | Based on the agreement, the CPS window size is [n+TA, n+TB], where n+TA is M logical slots earlier than slot , and n+TB is slots earlier than . In order to have a valid CPS window, n+TB > n+TA, thus , the minimum value of , thus the range of M should be from 5 to 30. Note that if n+TA = n+TB, which means CPS is disabled. There is no agreement to disable CPS. |
| Samsung | 0 … 30 | Yes | Value 0 should be able. The flexibility to disable CPS for additional power savings though configuration should be supported. There is nothing in the agreement that restricts the value to positive values only. |
| OPPO | 5..30 | Yes | Since this is for periodic transmission (triggering slot n is predictable), we don’t see there is any reason to disable / not perform CPS. |

**1.7 IE of minNumCandidateSlots**

**Question 7**: Companies provide their views of how the field of ‘Value range' should be defined. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| minNumCandidateSlots | New | minNumCandidateSlots | Indicates the minimum number of Y slots that are included in the possible candidate resources.corresponding to periodic-based partial sensing. | TBD | NA | Per resource pool | UE-specific or Cell-specific | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Value range** | **Comment** |
| LGE | 1,2,…,32 | According to LTE specification, the minimum number of Y SF is from 1 to 13. Meanwhile, in NR sidelink, the maximum number of (re)transmission is increased into 32. In this case, the minimum number of Y can be 32 as well. |
| Ericsson | Up to 32 slots | The minNumCandidateSlots can be up to the full selection window size. |
| Huawei, HiSilicon | 1…32 | Agree with LG that extension to at least 32 is necessary to support maximum number of (re)transmission. |
| Samsung | 1, 2, … 13 | Similar to LTE SL |
| OPPO | 1..32 | Same view as LGE |

**1.8 IE of typeUEAScheme2**

**Question 8**: Companies provide their views of how the fields of 'Description', 'Value range', ‘Default value aspect’, ‘Per (UE, cell, TRP, …)’ and ‘UE-specific or Cell-specific’ should be defined. Note that for the convenience of email discussion, the relevant agreements/working assumptions/conclusions are temporarily described as a memo.

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| **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| typeUEAScheme2 | New | typeUEAScheme2 | Indicates that a non-destination UE of a TB transmitted by UE-B can be UE-A, when UE-A is a destination UE of another conflicting TB. | Enabled | FFS | FFS | FFS | 38.331 | {See the memo on the right for the relevant agreements} |

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| **Company** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Comment** |
| LGE | OK | Enabled | Disabled | Per resource pool | UE-specific or cell-specific | The features of inter-UE coordination information is (pre)configured per resource pool. To differentiate it across UEs, UEs participating inter-UE coordination operation needs to be PC5-RRC connected. |
| Ericsson | No. See comments. |  |  |  |  | We think that the description field has to provide more information than the agreement. It should also avoid using obscure terminology like “non-destination UE” or UE-A / UE-B (unless these are used everywhere in the specification)  Something like the following seems more appropriate:  *Indicates that a UE that is not an intended destination for a TB transmitted by a second UE but is intended destination of a second TB transmitted by another UE can transmit inter UE coordination information using Scheme 2.*  Further refinement would be acceptable to us too.  This comment seems relevant for other IEs, as explained above. |
| Huawei, HiSilicon | Ok | Enabled | If not present, this behavior is not supported | Per resource pool | UE-specific or cell-specific | The IE is either present (for enabled) or absent (for disabled), but does not have a default value in ASN.1. |
| Samsung | OK | Allowed, not allowed | Not allowed | Per resource pool | Cell-specific | This parameter should be cell-specific only as it requires all users of a resource pool to have the same configuration of whether this condition is enabled or not. |
| OPPO | Comments | Enabled |  | Per resource pool | UE-specific, Cell-specific | Suggest to clarify the description a bit as below:  Indicates that a non-destination UE of a TB transmitted by UE-B can be UE-A, when UE-A is a destination UE of another TB conflicting with the TB transmitted by UE-B.  Default value is not needed. |

1. **Reference**
2. R1-2110649 [106bis-e-R17-RRC-Sidelink] Summary of email discussion on Rel-17 RRC parameters for sidelink enhancement Moderator (LG Electronics)
3. **Appendix**

**3.1 Agreements on resource allocation for power saving**

**3.1.1 RAN1#103-e meeting**

* ***Conclusion***
  + *SL reception Type A and Type D should be used as the reference for evaluation and designing of SL power saving features in R17.* 
    - *Type A: UE is not capable of performing reception of any SL signals and channels, FFS with exception of performing PSFCH and S-SSB reception (aim to conclude in RAN1#104-e)*
    - *Type D: UE is capable of performing reception of all SL signals and channels defined in R16. It does not preclude UE to perform reception of a subset of SL signals/channels*
    - *If there are evaluations with assumptions other than the above reference, the detailed assumptions need to be reported*
    - *Note: the types and the associated capability defined here are not intended to be defined as Rel-17 UE features as is.*
* *Agreements:*
  + *Partial sensing based RA is supported as a power saving RA scheme*
    - *FFS details*
  + *Random resource selection is supported as a power saving RA scheme*
    - *FFS any changes or enhancement*
    - *FFS on conditions to apply random resource selection*
* *Agreements:*
  + *In R17, a SL Mode 2 Tx resource pool can be (pre-)configured to enable full sensing only, partial sensing only, random resource selection only, or any combination(s) thereof*
    - *FFS details, including usage, potential restrictions, whether/how any enhancement or condition is needed for the coexistence of full sensing and power saving RA scheme(s) in a same resource pool, etc.*
* *Agreements:*
  + *Re-evaluation and pre-emption checking are not supported by UEs that do not perform any sensing (i.e. PSCCH reception)*
  + *Re-evaluation and pre-emption checking are supported by UEs that perform sensing*
    - *FFS details and any conditions(s) in which re-evaluation and pre-emption can be performed*
  + *FFS whether/how re-evaluation and pre-emption can be supported by UEs performing random resource selection that do perform sensing*
  + *Note: details about sensing in this context, including when it is performed, are not decided yet.*
* *Agreements:*
  + *Further study congestion control based on CBR and CR for power saving RA schemes*
    - *Identify necessary changes from R16 CBR/CR (if any), including transmission resource selection and transmission parameters that can be adjusted and applicable to power savings RA schemes*
    - *Note: this is not intended to require all UEs to perform sensing for the purpose of CBR measurement*

**3.1.2 RAN1#104-e meeting**

* *Agreements:*
  + *Random resource selection is applicable to both periodic and aperiodic transmissions*
    - *FFS conditions for random resource selection*
* ***Conclusion****:*
  + *PSFCH reception is not included for Type A UE*
  + *S-SSB reception is not included for Type A UE*
  + *SL reception Type B is additionally added*
    - *Type B: Same as Type A with an exception of performing PSFCH and S-SSB reception*
  + *Note: the same conditions as in RAN1#103-e regarding the context of the discussion of Type A and Type D still apply (also applicable to type B)*
* *Agreements:* 
  + *In a resource pool (pre-)configured with at least partial sensing, if UE performs periodic-based partial sensing, at least when the reservation for another TB (when carried in SCI) is enabled for the resource pool and resource selection/reselection is triggered at slot n, it is up to UE implementation to determine a set of Y candidate slots within a resource selection window, where*
    - *FFS condition(s) and timing(s) for which periodic-based partial sensing is performed by UE*
    - *The resource selection window is [n+T1, n+T2]*
      * *As a baseline, T1 and T2 are defined in the same way as in R16 NR-V2X according to step 1 [TS 38.214 Sec. 8.1.4]*
      * *Further discuss whether or not to introduce a threshold to re-define T1 and T2 such that* 
        + *T1 ≥ 0 (subject to processing time constraint Tproc, 1), and T2 ≤ remaining PDB*
        + *T2-T1 ≤ (pre-)configured threshold*
    - *A minimum value for Y is (pre-)configured from a range of values, FFS details*
    - *FFS any restriction to determine Y candidate slots (including its relationship with SL-DRX)*
    - *FFS whether the resource selection window [n+T1, n+T2] should be confined within a set of periodic set of resources and its relationship with SL-DRX*
    - *Note: The terminology “periodic-based partial sensing” is based on the “partial sensing” used in LTE-V and it is intended to be used for the design and discussion of partial sensing in Rel-17.*
* *Agreements:* 
  + *In a resource pool (pre-)configured with at least partial sensing, if UE performs periodic-based partial sensing, at least when the reservation for another TB (when carried in SCI) is enabled for the resource pool and resource selection/reselection is triggered at slot n, the UE monitors slots of at least one periodic sensing occasions, where a periodic sensing occasion is a set of slots according to*

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*if tvSL is included in the set of Y candidate slots.*

* + - *Preserve is a periodicity value from the configured set of possible resource reservation periods allowed in the resource pool (sl-ResourceReservePeriodList). Down select to one:*
      * *Option 1: Preserve corresponds to all values from the configured set sl-ResourceReservePeriodList*
      * *Option 2: Preserve corresponds to a subset of values from the configured set sl-ResourceReservePeriodList*
        + *FFS how to determine the subset (e.g., by (pre-)configuration, UE determination)*
      * *Option 3: Preserve is a common divisor among values in the configured set sl-ResourceReservePeriodList*
      * *Option 4: FFS others*
    - *k is selected according to (down select to one)*
      * *Option 1: Only the most recent sensing occasion for a given reservation periodicity before the resource (re)selection trigger or the set of Y candidate slots subject to processing time restriction*
      * *Option 2: The two most recent sensing occasions for a given reservation periodicity before the resource (re)selection trigger or the set of Y candidate slots subject to processing time restriction*
      * *Option 3: All possible sensing occasions after*
      * *Option 4: Only one periodic sensing occasion for one reservation period. The k value is up to UE implementation. Max value for k is (pre-)configured.*
      * *Option 5: k is (pre-)configured, including multiple values*
      * *Option 6: (pre-)configuration of a bitmap, same as in LTE-V*
      * *Option 7: FFS others*
    - *FFS relationship between periodic sensing occasions and SL-DRX*
    - *FFS condition(s) and timing(s) for which periodic-based partial sensing is performed by UE*
    - *Note: companies are encouraged to show performance data for the down selections*
* *Agreements:*
  + *In a resource pool (pre-)configured with at least partial sensing, if UE performs contiguous partial sensing and resource (re-)selection is triggered in slot n, support the following option:*
    - *Option 1: For the purpose of resource (re-)selection, the UE monitors slots between [n+TA, n+TB] and performs identification of candidate resources, in or after slot n+TB, based on all available sensing results, including periodic-based partial sensing results (if applicable).*
      * *FFS TA, TB (including the possibility of equal to zero, positive or negative) and remaining details (in particular, whether there should be exclusion of slots, changes in TA/TB values for different purposes, etc.)*
      * *FFS whether n can be replaced by e.g., index of some of Y candidate slots*
    - *FFS condition(s) in which contiguous partial sensing is performed by UE*
    - *FFS interaction with SL-DRX, if any*
    - *FFS interaction with periodic-based partial sensing, if any*
    - *Other options are not precluded*
    - *Note: This option is not to replace random resource selection only without sensing or re-evaluation and pre-emption checking*

**3.1.3 RAN1#104bis-e meeting**

* ***Conclusion****:*
  + *In periodic-based partial sensing,*
    - *It is not necessary to further discuss whether or not to introduce a threshold to re-define T1 and T2.*
* *Agreements:*
  + *In periodic-based partial sensing,*
    - *For the set of Preserve values, down-select to one of the following in RAN1#105-e*
      * *Alt.1: Preserve corresponds to all values from the configured set sl-ResourceReservePeriodList*
      * *Alt.2: A set of Preserve values is (pre-)configured and includes up to the full set of values from the configured set sl-ResourceReservePeriodList*
        + *FFS if support multiple sets of Preserve values based on one or more metrics*
        + *FFS whether/how to restrict the set of values*
    - *For the k value, down-selection to one of the following in RAN1#105-e (further refinement of each of the alternatives is possible)*
      * *Alt 1: Option 1 as in RAN1#104-e*
      * *Alt 2: A modified Option 5 as in RAN1#104-e, where the modification is such that it also includes option 1*
        + *FFS how to (pre-)configure (e.g. including bitmap), whether a maximum number of k values is needed, and whether it can be up to UE implementation to select a k value based on the (pre-)configuration*
      * *FFS details, e.g., sensing before the resource (re)selection trigger or the first slot of the set of Y candidate slots subject to processing time restriction, etc.*
    - *Note: companies are encouraged to provide more evaluations*
* *Agreement:*
  + *When periodic-based partial sensing is potentially performed by UE in a mode 2 Tx resource pool provided by higher layer, at least all of the followings are met:*
    - *Periodic reservation for another TB (sl-MultiReserveResource) is enabled for the resource pool*
    - *The resource pool is (pre-)configured to enable partial sensing*
    - *Partial sensing configured by higher layer in the UE*

**3.1.4 RAN1#105-e meeting**

* *Agreement:*
  + *For the set of Preserve values in periodic-based partial sensing,* 
    - *If no (pre-)configuration (i.e., by default), Preserve corresponds to all values from the (pre-)configured set sl-ResourceReservePeriodList.*
    - *Otherwise, a single set of Preserve values can be (pre-)configured, where the set of Preserve values are restricted to a subset of the (pre-)configured set sl-ResourceReservePeriodList*
      * *This is per mode 2 Tx resource pool (pre-)configuration*
      * *A UE by implementation may also monitor other sl-ResourceReservePeriodList values not part of the restricted subset* 
        + *In particular, the UE may additionally monitor occasions corresponding to PRSVP\_TX*

*FFS whether the monitoring can be mandatory*

* *Agreement:*
  + *In periodic-based partial sensing for resource (re)selection, the UE at least monitors in periodic sensing occasion(s) for a given reservation periodicity before the first slot of the selected Y candidate slots subject to processing time restriction for the identification of candidate resources.*
    - *The processing time restriction includes T SLproc,0  and T SLproc,1.*
    - *Aspects relating to sensing during SL DRX are to be discussed separately*
  + *Relationship to re-evaluation and pre-emption operation for periodic-based partial sensing to be discussed separately*
    - *FFS details including whether monitoring of periodic sensing occasions between triggering slot n and the first slot of the selected Y candidate slots subject to processing time restriction is performed as part of resource (re)selection or re-evaluation and pre-emption checking*
* *Agreement:*
  + *For the k value in periodic-based partial sensing for resource (re)selection,*
    - *before the resource (re)selection trigger slot n or the first slot of the set of Y candidate slots subject to processing time restriction.*
    - *If (pre-)configured, UE additionally monitors periodic sensing occasions that correspond to a set of values which can be (pre-)configured with at least one value*
      * *(Working assumption) Possible values correspond to the most recent sensing occasion for a given reservation periodicity before the resource (re)selection trigger slot n or the first slot of the set of Y candidate slots, and the last periodic sensing occasion prior to the most recent one for the given reservation periodicity are included.*
      * *FFS: whether/which other values and details of the (pre-)configuration (e.g. max number of values or sensing occasions)*
      * *FFS: whether a value denotes a specific occasion to monitor or the earliest occasion to start the monitoring.*
    - *FFS relationship between periodic-based partial sensing occasions and SL-DRX*
    - *Note:*
      * *This is for the case when the resource (re)selection triggering slot n is expected by UE*
* *Agreement:*
  + *For random resource selection,*
    - *Reuse the maximum distance separation of 32 logical slots for a HARQ retransmission resource reserved by a prior SCI for the same TB, which was defined in R16 for full sensing operation.*
    - *SL HARQ feedback enabled transmission is supported (FFS applicable conditions if any)*
      * *The minimum HARQ feedback time gap (Z) shall be respected between any two selected resources of a TB where a HARQ feedback for the first of these resources is expected.*
  + *FFS the impact of resource collision when random resource selection is performed by a UE which does not perform sensing / re-evaluation and pre-emption checking in a resource pool with mixed RA schemes (e.g. for low priority or any priority transmissions).*
    - *Including study potential solution(s) if the impact is not negligible (e.g. threshold based, raising priority, minimum time gap, pattern based, a priori SCI reserving initial transmissions, resource pool partitioning, and etc.).*
* *Agreement:* 
  + *In contiguous partial sensing for resource (re)selection, TA and TB values can be zero, positive or negative* 
    - *TA and TB values or range depend on different operating scenarios or conditions (e.g., periodic/aperiodic traffic, predictability of triggering slot n, remaining PDB, re-evaluation/pre-emption checking, HARQ feedback, CBR/CR parameter, power saving, etc)*
      * *FFS details*
    - *FFS: details of how periodic-based partial sensing and contiguous partial sensing are used for re-evaluation and pre-emption checking. Including how to reduce UE’s power consumption (caused by additional sensing operation of re-evaluation/pre-emption) after its resource selection, with the considerations of different operating scenarios or conditions (e.g., pre-emption enabled/disabled, HARQ-ACK enabled/disabled, etc).*

**3.1.5 RAN1#106-e meeting**

* *Agreement:*
  + *In periodic-based partial sensing, UE monitoring of periodic sensing occasions between triggering slot n and the first slot of the selected Y candidate slots subject to processing time restriction is performed as part of resource (re)selection.*
* *Agreement:*
  + *Conditions in which contiguous partial sensing is performed by UE, when at least all of the followings are met:*
    - *L1 [is expected to be or] is triggered by higher layer to report resources for resource (re-)selection in a mode 2 Tx pool*
      * *FFS: When the trigger will be received by L1*
    - *The resource pool is (pre-)configured to enable partial sensing*
    - *Partial sensing is configured by higher layer in the UE*
* *Agreement:*
  + *For a resource pool (pre-)configured with at least partial sensing and UE is configured by its higher layer for partial sensing,* 
    - *Periodic-based partial sensing and contiguous partial sensing schemes are supported for resource re-evaluation and pre-emption checking*
      * *FFS details of partial sensing for re-evaluation and pre-emption checking, including any restrictions / conditions on performing PBPS and CPS, subset of resources, timing, candidate resource set (SA) and etc*
  + *Same as in Rel-16, the higher layer indicates a set of resources and/or a set of resources for re-evaluation and/or pre-emption checking, respectively*
    - *Pre-emption checking is enabled according to the Release-16 interpretation of sl-PreemptionEnable.*
      * *FFS: If additional enhancements are needed for enabling/disabling*
  + *The triggering of re-evaluation and pre-emption checking is as in R16.*
* *Agreement:*
  + *When UE performs only contiguous partial sensing (CPS) in a mode 2 Tx pool with periodic reservation for another TB (sl-MultiReserveResource) disabled, and a resource (re)selection is triggered in slot n,*
    - *The resource selection window (RSW) is [n+T1, n+T2] where T2 is defined based on step 1) of Rel-16 TS 38.214 Sec. 8.1.4*
      * *FFS whether the resource selection window [n+T1, n+T2] should be confined within a set of periodic set of resources and its relationship with SL-DRX*
    - *On the sensing window [n+TA, n+TB] for CPS,*
      * *Details of TA and TB values based on the agreements from previous RAN1 meetings*
      * *FFS whether and how to define a minimum CPS window size, including (pre-)configurability and the case when TB - TA is smaller than the minimum CPS window size*
      * *FFS whether and how to define a maximum value / upper bound for TB with respect at least to the minimum RSW size and the remaining PDB, including (pre-)configurability*
    - *FFS how a set of candidate resource (SA) is initialized considering candidate single-slot resources, including*
      * *Whether and how to define a minimum size for the RSW (e.g., Rel-16 T2min), including (pre-)configurability*
      * *Whether the set SA is confined within a set of Y candidate slots within the RSW*
    - *UE performs resource exclusion from the set SA based on at least all available sensing results and based on step 6) and 7) of Rel-16 TS 38.214 Sec. 8.1.4*
    - *Note, re-evaluation and pre-emption checking in a resource pool with periodic reservation for another TB (sl-MultiReserveResource) disabled is considered separately.*
    - *FFS: Details on T1*
* *Agreement:*
  + *For random resource selection in a resource pool (pre-)configured with full/partial sensing and random resource selection, down-select to one of the followings in RAN1#106bis-e*
    - *Option 1: A priority threshold value or a range of priority levels is (pre-)configured for the resource pool, below or within which random resource selection is allowed*
      * *Note, lower value means higher priority*
      * *FFS whether resource pool partitioning can be additionally applied*
    - *Option 2: Increase the priority for the transmission based on random selection and indicate the new priority value in the priority field in the 1st-stage SCI*
      * *FFS: An extra field is added in SCI for indicating the original priority value associated with QoS requirement,*
      * *FFS: A 1-bit field in the SCI indicates that the UE is performing random resource selection, or*
      * *FFS: An extra field is added in SCI for indicating the mapping to the original priority value associated with QoS requirement.*
    - *Option 7: Exclude resources reserved by UE performing random selection without re-evaluation / pre-emption checking, regardless of their priorities. E.g. a 1-bit field in the SCI indicates that the UE is performing random resource selection and not performing re-evaluation and pre-emption checking*
    - *Option 12: No special consideration*
* *Agreement:*
  + *When UE performs periodic-based and contiguous partial sensing schemes in a mode 2 Tx pool with periodic reservation for another TB (sl-MultiReserveResource) enabled,*
    - *For a resource (re)selection procedure triggered by aperiodic transmission (Prsvp\_TX=0) in slot n,*
      * *The resource selection window (RSW) is [n+T1, n+T2], and T1 and T2 are defined in the same way according to step 1) of Rel-16 TS 38.214 Sec. 8.1.4*
        + *FFS whether UE determines a new set of Y candidate slots within the RSW and monitors corresponding periodic sensing occasions between slot n and the first slot of the new Y candidate slots subject to processing constraints*
        + *FFS how to initialize a set of candidate resource (SA) for the triggered resource (re)selection procedure and which partial sensing scheme(s) and results can be used for resource exclusion in the resource (re)selection procedure*
        + *FFS whether the resource selection window [n+T1, n+T2] should be confined within a set of periodic set of resources and its relationship with SL-DRX*
    - *Note, re-evaluation and pre-emption checking based on periodic-based and contiguous partial sensing schemes is considered separately*
* *Agreement:*
  + *When UE performs periodic-based and contiguous partial sensing schemes in a mode 2 Tx pool with periodic reservation for another TB (sl-MultiReserveResource) enabled,*
    - *For a resource (re)selection procedure triggered by periodic transmission (Prsvp\_TX≠0) in slot n*
      * *A set of candidate resource (SA) is initialized to the set of selected Y candidate slots of PBPS*
        + *UE performs contiguous partial sensing in [n+TA, n+TB] for resource exclusion from the initialized candidate resource set (SA)*

*FFS details of TA and TB based on the agreement(s) from previous RAN1 meetings*

* + - *Note, re-evaluation and pre-emption checking based on periodic-based and contiguous partial sensing schemes is considered separately*
  + *FFS: The condition under which UE performs periodic-based and contiguous partial sensing schemes in a mode 2 Tx pool with periodic reservation for another TB (sl-MultiReserveResource) enabled*
* *Agreement:*
  + *A UE can perform SL reception of PSCCH and RSRP measurement for sensing during its SL DRX inactive time.*
    - *FFS: When such reception and measurement is performed, whether it is subject to specification, or is up to UE implementation*
    - *FFS: Other details*

**3.1.6 RAN1#106bis-e meeting**

* *Agreement:*
  + *In the agreement from RAN1#105-e, the working assumption is confirmed and the FFS bullet (in RED) is closed without any agreement.*

|  |
| --- |
| *Agreement from RAN1#105-e:*   * + *For the k value in periodic-based partial sensing for resource (re)selection,*     - *before the resource (re)selection trigger slot n or the first slot of the set of Y candidate slots subject to processing time restriction.*     - *If (pre-)configured, UE additionally monitors periodic sensing occasions that correspond to a set of values which can be (pre-)configured with at least one value*       * *(Working assumption) Possible values correspond to the most recent sensing occasion for a given reservation periodicity before the resource (re)selection trigger slot n or the first slot of the set of Y candidate slots, and the last periodic sensing occasion prior to the most recent one for the given reservation periodicity are included.*       * *FFS: whether/which other values and details of the (pre-)configuration (e.g. max number of values or sensing occasions)*       * *FFS: whether a value denotes a specific occasion to monitor or the earliest occasion to start the monitoring.*     - *FFS relationship between periodic-based partial sensing occasions and SL-DRX*     - *Note:*       * *This is for the case when the resource (re)selection triggering slot n is expected by UE* |

* *Agreement:*
  + *When UE performs periodic-based and contiguous partial sensing schemes in a mode 2 Tx pool with periodic reservation for another TB (sl-MultiReserveResource) enabled,* 
    - *For a resource (re)selection procedure triggered by periodic transmission () in slot n, TA and TB for the CPS monitoring window is defined according to one of the followings:*
      * *n+TA is M logical slots earlier than slot , and n+TB is slots earlier than , where is the first slot of the selected Y candidate slots of PBPS, and , are in units of physical time/slots.*
        + *By default, M is 31 unless (pre-)configured with another value.*
* *Agreement:*
  + *For the periodic sensing occasion(s) (PSO(s)) that a UE needs to additionally monitored in PBPS, it shall be (pre-)configured jointly for all Preserve values.*
    - *The UE is not required to monitor PSOs earlier than n–T0 if the UE is triggered to do resource (re)selection in slot n, where T0 is (pre-)configured*
* *Agreement:*
  + *When UE performs at least contiguous partial sensing in a mode 2 Tx pool for a resource (re)selection procedure triggered by aperiodic transmission (Prsvp\_TX=0) in slot n, TA and TB for CPS monitoring window and a candidate resource set (SA) is initialized according to potentially one of the following approaches (final decision in RAN1#107-e). Other approaches are not precluded and the details in each approach can still be updated.*
    - *Approach 1: (SA is initialized based on at least slots with PBPS and/or CPS results and guarantee a minimum of M slots for CPS)*
      * *The UE selects a set of Y’ candidate slots with corresponding PBPS and/or CPS results (if available) within the RSW.*
        + *FFS how to handle the case if the total number of Y’ candidate slots is less than a (pre-)configured threshold Y’min without dropping the aperiodic transmission*
        + *FFS whether the Y’ candidate slots for aperiodic transmission is the same as the Y candidate slots in PBPS for periodic transmission of another TB(s)*
        + *FFS whether/how to prioritize/select resources based on partial sensing results.*
        + *FFS: How to select Y’ in case of CPS only*
      * *Candidate resource set (SA) is initialized to the set of all single-slot candidate resources in the selected Y’ candidate slots.*
      * *For the CPS monitoring window [n+TA, n+TB]:*
        + *TA and TB are both selected such that UE has sensing results for a minimum of M consecutive logical slots before ty0, where ty0 is the first slot of the selected Y’ candidate slots.*

*FFS: By default, M is 31 unless (pre-)configured with another value, or M is (pre-)configured based on transmission priority*

*FFS the range of (pre-)configured M from a TBD lowest value up to 30*

*FFS: how to handle the case when the minimum M slots for CPS cannot be guaranteed*

* + - * *FFS: RSW in case of CPS only*
  + *Approach 2: (SA is initialized based on all candidate single-slot resources and guarantee a minimum of M slots for CPS)*
    - *Candidate resource set (SA) is initialized to the set of all candidate single-slot resources in [n+TB+Tproc,0+Tproc,1, n+T2], where TB is selected by the UE such that length of [n+TB+Tproc,0+Tproc,1, n+T2] ≥ T2min.*
      * *Tproc,0, Tproc,1 are in units of physical time/slots*
      * *FFS whether/how to prioritize/select resources based on partial sensing results (if PBPS is performed).*
    - *For the CPS monitoring window [n+TA, n+TB]:*
      * *TA = X*
        + *FFS value X for TA including X=1 and negative value*
      * *TB is selected such that UE has sensing results for a minimum of M consecutive logical slots before the start of (n+TB+Tproc,0+Tproc,1).*
        + *FFS: By default, M is 31 unless (pre-)configured with another value, or M is (pre-)configured based on transmission priority*
        + *FFS the range of (pre-) configured M from a TBD lowest value up to 30*
        + *FFS: how to handle the case when the minimum M slots for CPS cannot be guaranteed*
  + *Approach 3: (independent approach for different case)*
    - *When UE additionally performs periodic-based partial sensing in the resource pool, the above Approach 1 applies.*
    - *When UE does not perform periodic-based partial sensing in a resource pool that does not allow resource reservation for another TB, the above Approach 2 applies.*
* *Working Assumption*
  + *In a resource pool (pre-)configured to enable partial sensing, when UE is configured with partial sensing by its higher layer, the resources for which the UE performs re-evaluation and/or pre-emption checking are for the initial transmission and retransmissions of every TB according to Rel-16 specification based on partial sensing results.*
    - *Same as in Rel-16, for periodic transmission, re-evaluation check is not applied to the resources that have been signalled in current period or previous periods, except that it is up to UE implementation whether to apply re-evaluation check to the resources in non-initial reservation period that have been signalled neither in the immediate last nor in the current period.*
    - *The resource in the main bullet is the set of resources (r0,r1,r2,…) and/or the set of resources (r0',r1',r2',…)  for re-evaluation and/or pre-emption checking, respectively, which has been agreed in RAN1 #106-e.*
* *Working Assumption*
  + *When PHY layer is indicated with an active time of RX UE from MAC layer for candidate resource selection, a restriction is applied in PHY layer so that at least a subset of candidate resources reported to MAC layer is located within the indicated active time of the RX UE. The following options will be further discussed in RAN1 to restrict resources for candidate resource selection taking into account the indicated active time from MAC layer:*
    - *Option 1: PHY layer selects and reports candidate resources only within the indicated active time of the RX UE*
    - *Option 2: PHY layer selects and reports candidate resources in which at least a subset of the candidate resources is within the indicated active time of the RX UE*
    - *Option 3: PHY layer selects and reports an additional candidate resource set of candidate resources within the indicated active time of the RX UE*

**3.1.7 RAN1#107-e meeting**

* *Agreement:*
  + *When UE performs at least contiguous partial sensing in a mode 2 Tx pool for a resource (re)selection procedure triggered by aperiodic transmission (Prsvp\_TX=0) in slot n, the general design framework in Approach 1 from RAN1#106bis-e in below is adopted. Note that, the details can still be updated.*
    - *Approach 1: (SA is initialized based on at least slots with PBPS and/or CPS results and guarantee a minimum of M slots for CPS)*
      * *The UE selects a set of Y’ candidate slots with corresponding PBPS and/or CPS results (if available) within the RSW.*
        + *FFS how to handle the case if the total number of Y’ candidate slots is less than a (pre-)configured threshold Y’min without dropping the aperiodic transmission*
        + *FFS whether the Y’ candidate slots for aperiodic transmission is the same as the Y candidate slots in PBPS for periodic transmission of another TB(s)*
        + *FFS whether/how to prioritize/select resources based on partial sensing results.*
        + *FFS: How to select Y’ in case of CPS only*
      * *Candidate resource set (SA) is initialized to the set of all single-slot candidate resources in the selected Y’ candidate slots.*
      * *For the CPS monitoring window [n+TA, n+TB]:*
        + *TA and TB are both selected such that UE has sensing results for a minimum of M consecutive logical slots before ty0, where ty0 is the first slot of the selected Y’ candidate slots.*

*FFS: By default, M is 31 unless (pre-)configured with another value, or M is (pre-)configured based on transmission priority*

*FFS the range of (pre-)configured M from a TBD lowest value up to 30*

*FFS: how to handle the case when the minimum M slots for CPS cannot be guaranteed*

* + - * *FFS: RSW in case of CPS only*
* *Agreement:*
  + *When SL DRX active time of Rx-UE is provided by the higher layer for candidate resource selection (including resource (re)selection and re-evaluation/pre-emption checking), the following working assumption is confirmed with option 2 as agreement (with modification in RED)*
  + *Working Assumption (RAN1#106bis-e)*
    - *When PHY layer is indicated with an active time of RX UE from MAC layer for candidate resource selection, a restriction is applied in PHY layer so that at least a subset of candidate resources reported to MAC layer is located within the indicated active time of the RX UE. The following options will be further discussed in RAN1 to restrict resources for candidate resource selection taking into account the indicated active time from MAC layer:*
      * *~~Option 1: PHY layer selects and reports candidate resources only within the indicated active time of the RX UE~~*
      * *Option 2: PHY layer selects and reports candidate resources in which at least a subset of the candidate resources is within the indicated active time of the RX UE*
        + *FFS: Details on when the number of subsets of candidate resource is less than the threshold*
        + *FFS: The subset of candidate resource outside of the active time should consider each inactive time period*
        + *FFS: UE selection of resource selection window to overlap with indicated RX UE active time*
        + *FFS: Whether it is up to UE implementation to report candidate resources only within the indicated active time of the RX UE*
      * *~~Option 3: PHY layer selects and reports an additional candidate resource set of candidate resources within the indicated active time of the RX UE~~*

**3.2 Agreements on inter-UE coordination for Mode 2 enhancements**

**3.2.1 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*

**3.2.2 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*

**3.2.3 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*

**3.2.4 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)*

**3.2.5 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 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*
* *Working Assumption*
  + *For Condition 1-B-1 of Scheme 1, the following two options are supported*
    - *Option 1: Reserved resource(s) of other UE(s) 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(s)*
    - *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(s) when UE-A is a destination of a TB transmitted by the UE(s)*
* *Working Assumption*
  + *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*
* *Agreement:* 
  + *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*
      * *Resource reservation interval* 
        + *It replaces P\_rsvp\_TX*
      * *FFS: Starting/ending time location of resource selection window*
    - *FFS : In addition to Rel-16 procedure, use inter-UE coordination information from other UEs*
      * *If there is no consensus in RAN1#106bis-e, no further discussions for Rel-17*
* ***Conclusion****:*
  + *No consensus that UE-A uses inter-UE coordination information from other UEs when it determines the preferred resource set for Condition 1-A-1 of Scheme 1.*
* *Working Assumption*
  + *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*
      * *This can be disabled by RRC (pre-)configuration*
* *Agreement:* 
  + *For allocating PSFCH resources in Scheme 2, at least following can be (pre)configured separately from those for SL HARQ-ACK feedback.*
    - *Set of PRBs for PSFCH transmission/reception (sl-PSFCH-RB-Set)*
* *Agreement:* 
  + *For Scheme 2,* 
    - *Index of a PSFCH resource for inter-UE coordination information transmission is determined in the same way according to Rel-16 TS 38.213 Section 16.3 with at least following modification*
      * *P\_ID is L1-Source ID indicated by UE-B’s SCI*
      * *M\_ID is 0*
    - *FFS: How to set m\_CS*
    - *FFS: How to set m\_0*
    - *FFS: Whether M\_ID can be (pre)configured*

**3.2.6 RAN1#107-e meeting**