**3GPP TSG RAN meeting #94e RP-21xxxx**

**Electronic Meeting, Dec. 6-17, 2021**

## Status Report to TSG

**Agenda item:** 9.3.1.3

|  |  |
| --- | --- |
| **WI / SI Name** |  |
| included in this status report | Study Item: No | Core part: Yes | Performance part:Yes | Testing part:No |
| **Acronym** | NR\_SL\_enh |
| **Unique ID** | 860042 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-202846 |
| **Target Completion Date****(indicate if changed)** | Study Item: mm/yyyy | Core part: 03/2022 | Performance part: 09/2022 | Testing part: mm/yyyy |
| **Overall Completion level** | Study Item: xx % | Core part: 80% | Performance Part: 0% | Testing part: xx% |

The original plan was to complete RAN1 work by RAN#94-e but the achieved completion level of RAN1 work is 85%. RAN guidance is requested so that RAN1 can close the essential open issues and complete its work by RAN#95-e.

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN WG1 |
| **Rapporteur** | **Name** | Seungmin Lee |
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## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

**RAN1#106bis-e**:

Regarding resource allocation for power saving, the following agreements/working assumptions were made:

* Agreements on details of periodic-based partial sensing and contiguous partial sensing operations
	+ 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
 |

* + 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 ($P\_{rsvp\\_TX}\ne 0$) 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 $t\_{y0}^{SL}$, and n+TB is $T\_{proc,0}^{SL}+T\_{proc,1}^{SL}$ slots earlier than $t\_{y0}^{SL}$, where $t\_{y0}^{SL}$ is the first slot of the selected Y candidate slots of PBPS, and $T\_{proc,0}^{SL}$, $T\_{proc,1}^{SL}$ are in units of physical time/slots.
				+ By default, M is 31 unless (pre-)configured with another value.
	+ 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
	+ 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 assumptions on details of re-evaluation and pre-emption checking procedures
	+ 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 assumptions on details of restriction on candidate resources reported to MAC layer
	+ 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

Regarding inter-UE coordination for mode 2 enhancements, the following agreements/working assumptions/conclusions were made:

* Agreements/working assumptions/conclusions on details of Scheme 1 for inter-UE coordination
	+ (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
	+ 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
* Agreements on details of Scheme 2 for inter-UE coordination
	+ 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
	+ 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
	+ 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)
	+ 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

**RAN1#107-e**:

Regarding resource allocation for power saving, the following agreements/working assumptions/conclusions were made:

* Agreements on details of periodic-based partial sensing and contiguous partial sensing operations
	+ 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
	+ 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 UE selects a set of Y’ candidate slots with corresponding PBPS and/or CPS results (if available) within the RSW.
			* If the total number of Y’ candidate slots is less than a (pre-)configured threshold Y’min,
				+ How UE includes other candidate slots is up to UE implementation
		- 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 starting at M consecutive logical slots before ty0 and ending at Tproc,0 + Tproc,1 slots earlier than ty0.
				+ FFS: By default, M is 31 unless (pre-)configured with another value, where M is (pre-)configured based on transmission priority
				+ FFS: The range of (pre-)configured M from a TBD lowest value up to 30
				+ When the minimum M slots for CPS cannot be guaranteed, support both

Option A, the UE ensures the Y’min criterion is fulfilled

Option B: UE performs random resource selection

When the UE performs Option A or Option B is up to UE implementation

* Agreements/conclusions on details of re-evaluation and pre-emption checking procedures
	+ (Conclusion) No additional triggering enhancement on top of existing Rel-16 mechanism in re-evaluation and pre-emption checking for partial sensing UEs in Rel-17, including enabling / disabling re-evaluation by (pre-)configuration.
		- This does not restrict the triggering of re-evaluation and pre-emption checking due to inter-UE coordination message in scheme 2 (if agreed).
	+ When UE is triggered to perform re-evaluation and pre-emption checking for periodic transmission (Prsvp\_TX≠0) in slot n,
		- During the qth reservation period (q=0,1,2,…, Cresel-1), candidate resource set (SA) is initialized to the remaining Y candidate slots starts from slot $t\_{yi}^{SL}$ and ends at the last slot of the Y candidate slots, where the slot indices of the remaining Y candidate slots are equal to [q x Prsvp\_Tx + $t\_{y}^{SL}$], where $t\_{y}^{SL}$ is a slot index of Y candidate slots used in the initial resource (re)selection.
			* $t\_{yi}^{SL}$ is the first candidate slot after slot n+T3.
			* FFS whether/how to handle the case when number of the remaining Y candidate slots is less than Ymin.
		- Scheme 1:
			* UE performs PBPS for the remaining Y candidate slots according to $t\_{y'-k×P\_{reserve}}^{SL}$, where $t\_{y'}^{SL}$ is a slot belong to the remaining Y candidate slots, and k and Preserve are the same as resource (re)selection.
			* UE performs CPS starts from M logical slots earlier than $t\_{yi}^{SL}$ to $T\_{proc,0}^{SL}+T\_{proc,1}^{SL}$ slots earlier than $t\_{yi}^{SL}$.
				+ By default, M is 31 unless (pre-)configured with another value.
* Agreements/working assumptions on details of CBR measurement and CR evaluation
	+ When UE performs random resource selection, LTE principle is reused:
		- The UE is not required to measure CBR.
		- When no SL CBR measurement result is available, a (pre-)configured SL CBR value is used.
	+ (Working assumption) For UE performs partial sensing or random resource selection, Rel-16 SL CR evaluation is directly reused.
	+ For SL CBR measurement in partial sensing, select one option in the following:
		- Option 1, 2, 3: SL RSSI is measured for slots in which the UE performs partial sensing and PSCCH/PSSCH reception over a SL CBR measurement window defined in Rel-16. The calculation of SL CBR is limited within the slots for which the SL RSSI is measured.
			* If the number of SL RSSI measurement slots is below a (pre-)configured threshold, FFS the following or other options.
				+ Option 1: a (pre-)configured SL CBR value is used.
				+ Option 2: the UE additionally measure a set of slots within the SL CBR measurement window to meet the threshold.
				+ Option 3: the UE measures an additional set of slots which can be extended outside the SL CBR measurement window to meet the threshold.
				+ FFS whether the set of slots in option 2/3 are (pre-) configured or selected by UE implementation.
		- Option 4: LTE principle is reused:
			* The UE is not required to measure CBR.
			* When no SL CBR measurement result is available, a (pre-)configured SL CBR value is used
* Agreements on details of restriction on candidate resources reported to MAC layer
	+ 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~~

Regarding inter-UE coordination for mode 2 enhancements, the following agreements/working assumptions/conclusions were made:

* Agreements on details of Scheme 1 for inter-UE coordination
	+ For Condition 1-A-2 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
		- UE-A excludes candidate single-slot candidate(s) belonging to “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” after Step 6) of TS 38.214 Section 8.1.4
	+ For Scheme 1, a resource pool level (pre-)configuration can enable one of the following alternatives:
		- Alt 1 (Working Assumption): MAC CE or 2nd SCI are used as the container of inter-UE coordination information transmission from UE A to UE B.
			* For the indication of resource set, the following is supported:
				+ N combinations of TRIV, FRIV, resource reservation period as specified in Rel-16 TS 38.214 Section 8.1.5 with following modification. The value of resource reservation period is omitted at least when the transmission of preferred resource set is triggered by UE-B’s explicit request.

First resource location of each TRIV is separately indicated by the inter-UE coordination information

* + - * + If [N <= 3], MAC CE is used and it is up to UE implementation to additionally use 2nd SCI. When 2nd SCI and MAC CE are both used, the same resource set is indicated in the 2nd SCI and the MAC CE. If [N > 3], only MAC CE is used.

FFS: UE capability details

2nd SCI is UE RX optional

* + - Alt 2: MAC CE is used as the container of inter-UE coordination information transmission from UE A to UE B.
			* For the indication of resource set, the following is supported:
				+ N combinations of TRIV, FRIV, resource reservation period as specified in Rel-16 TS 38.214 Section 8.1.5 with following modification. The value of resource reservation period is omitted at least when the transmission of preferred resource set is triggered by UE-B’s explicit request.

First resource location of each TRIV is separately indicated by the inter-UE coordination information

* + - FFS: Whether/How to use resource reservation information as coordination information
	+ For Scheme 1 with non-preferred resource set,
		- 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
	+ For Condition 1-A-1 of Scheme 1, when UE-A determines the set of resources preferred for UE-B’s transmission, apply RSRP threshold increase in the same way according to Rel-16 TS 38.214 Section 8.1.4.
		- FFS: Whether/how to introduce the maximum limit of RSRP threshold increase
	+ For Scheme 1, at least following parameters are provided by UE-B’s request:
		- Priority value to be used for PSCCH/PSSCH transmission
		- Number of sub-channels to be used for PSSCH/PSCCH transmission in a slot
		- Resource reservation interval
	+ For inter-UE coordination information triggered by an explicit request in Scheme 1,
		- UE-A uses a TX resource pool used for UE-B’s request transmission to determine the set of resources and to transmit the set of resources to UE-B
	+ For inter-UE coordination information triggered by a condition rather than request reception in Scheme 1,
		- UE-A transmitting in a resource pool provides inter-UE coordination information associated with the same resource pool
* Agreements/working assumptions/conclusions on details of Scheme 2 for inter-UE coordination
	+ A resource pool level (pre-)configuration uses either of the following options
		- Option 1: PSFCH occasion is derived by a slot where UE-B’s SCI is transmitted
			* Reuse PSSCH-to-PSFCH timing as specified in TS 38.213 Section 16.3 to determine the PSFCH occasion for resource conflict indication
			* Time gap between the PSFCH and a slot where expected/potential resource conflict occurs is larger than or equal to T\_3
		- Option 2: PSFCH occasion is derived by a slot where expected/potential resource conflict occurs on PSSCH resource indicated by UE-B’s SCI
			* UE-A transmits the PSFCH in a latest slot that includes PSFCH resources for inter-UE coordination information and is at least T\_3 slots of the resource pool before the PSSCH resource indicated by UE-B’s SCI in which expected/potential resource conflict occurs
			* FFS: How to account for processing timeline
		- Note that it is possible not to configure either option1 or option 2.
	+ When PSFCH TX/RX for Scheme 2 is overlapping with LTE SL TX/RX and/or UL in a UE, reuse prioritization rule as specified in TS 38.213 Section 16.2.4.1 and 16.2.4.3.1.
	+ (Conclusion) For Scheme 2, the values of the following parameters are the same as those for SL HARQ-ACK feedback in the same resource pool
		- 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)
	+ (Working assumption) A resource pool level (pre-)configuration can enable one of the following options:
		- Option 1:
			* For Condition 2-A-1 of Scheme 2, support following additional criteria to determine resource(s) where expected/potential resource conflict occurs
				+ For the case when UE-A is a destination UE of a TB transmitted by UE-B

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 for UE-B and other UE respectively

* + - * + For the case when UE-A is a destination UE of a TB transmitted by another UE

The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) when RSRP measurement of UE-B’s reserved resource 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 for other UE and UE-B respectively

* + - Option 4:
			* For Condition 2-A-1 of Scheme 2, support following additional criteria to determine resource(s) where expected/potential resource conflict occurs
				+ For the case when UE-A is a destination UE of a TB transmitted by UE-B

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.

* + - * + For the case when UE-A is a destination UE of a TB transmitted by another UE

The resource(s) are fully/partially overlapping in time-and-frequency with other UE’s reserved resource(s) when RSRP measurement of UE-B’s reserved resource is larger than a (pre)configured RSRP threshold compared to the RSRP measurement of the resource(s).

* + - * Support of Option 4 is subject to UE capability
		- FFS: Whether/how RSRP threshold depends on priority, MCS, overlap
	+ For Scheme 2, when PSFCH occasion is derived by a slot where expected/potential resource conflict occurs on PSSCH resource indicated by UE-B’s SCI,
		- Time gap between the PSFCH and SCI(s) scheduling conflicting TBs is larger than or equal to X value.
			* FFS: Details of X
	+ (Working assumption) For Condition 2-A-1 in Scheme 2, when “a non-destination UE of a TB transmitted by UE-B can be UE-A” is enabled or when “a non-destination UE of a TB transmitted by UE-B can be UE-A” is disabled and the destination UE of the conflicting TBs is UE-A, for each pair of UEs scheduling the conflicting TBs, a UE with the higher priority value is UE-B.
		- FFS whether/how to set additional condition for UE-A to send PSFCH.
		- Conclude on whether/how to handle, or differently handle, the case when at least one of UEs scheduling conflicting TBs doesn’t support Scheme 2 at the subsequent meetings

#### 2.1.2 Remaining Open issues

The followings are the remaining open issues. Note that no consensus has been reached in RAN1 on whether each issue in the following list is essential to the completion of the WI and whether the list is complete.

* Physical layer aspects on resource allocation to reduce UE’s power consumption including;
	+ Finalization of pre-emption/re-evaluation checking for aperiodic transmission
	+ Finalization of selection/report of candidate resources in which at least its subset is within RX UE's active time
	+ Finalization of SL CBR measurement in partial sensing
	+ CPS monitoring window for aperiodic transmission when UE performs at least CPS in a Tx pool
	+ T1 of RSW when UE performs only CPS in a Tx pool with periodic reservation for another TB disabled
	+ Sensing and SL CBR measurement during its SL DRX inactive time
	+ Re-evaluation and pre-emption checking after random selection
	+ Resource pool segregation for periodically occurring resources
	+ Random resource selection in pools with mixed RA schemes
	+ Conditions in which CPS can be disabled in resource (re)selection
* Physical layer aspects on solution(s) on enhancement(s) in mode 2 for enhanced reliability and reduced latency including
	+ Scheme 1
		- Finalization of contents and containers of UE-A’s inter-UE coordination information and UE-B’s explicit request, including determination of destination UE(s) for UE-A’s inter-UE coordination information and UE-B’s explicit request
		- Finalization of behaviour of UE-B receiving resource set(s) from UE-A(s)
		- Finalization of when and with which information UE-A generates and/or transmits an inter-UE coordination information, including triggering based on condition(s) other than an explicit request
		- Finalization of when UE-B generates and/or transmits an explicit request
		- Finalization of resource selection and/or multiplexing with sidelink transmissions for UE-A’s inter-UE coordination information and UE-B’s explicit request
		- Finalization of prioritization of inter-UE coordination information and explicit request
		- Combination of preferred/non-preferred resources with explicit request/condition triggers
	+ Scheme 2
		- Finalization of determination of PSFCH resource/index for conflict indication
		- Finalization of behaviour of UE-B receiving a conflict indication from UE-A
		- Finalization of prioritization of conflict indication
		- Finalization of how to determine UE-B among UEs scheduling conflicting TBs, including whether/how to handle, or differently handle, the case when at least one of UEs scheduling conflicting TBs doesn’t support Scheme 2
* Finalization of higher-layer parameters used in the physical layer

## 2.2 RAN2

#### 2.2.1 Agreements

**RAN2#116-e**:

Regarding sidelink DRX, the following agreements and working assumptions were made:

* Agreements on SL DRX design
* Previous RAN2 WA “SL DRX should take PSCCH monitoring also for sensing (in addition to data reception) into account if SL DRX is used” is dropped.
* Agreements on stage 3 open issues for RRC running CR:
* To remove implementations in clause 5.8.9.1.3[5] and clause 5.8.9.1.9[5].
* Remove the current 5.8.X and EN in 5.2.2.4.13. The behaviour description is revised as “2>if sl-DRX-Config-GC-BC is included in SIB12-IE: 3> store the NR sidelink DRX configuration and perform sidelink DRX operation”.
* Use one specific configuration which is not associated with QoS or L2 ID, for HARQ RTT timer and Retransmission timer of groupcast.
* Remove the current implementation in clause 5.7.4.3 regarding UE behaviour triggered by E-UTRA RRC message [5].
* Remove the current implementation and EN in Clause 5.3.5.9 Other configuration.
* Remove the current implementation in clause 5.7.4.1/2/3[5].
* RAN2 to decide related UE behaviour including using either UAI or SUI, for reporting DRX configuration or sidelink assistance information to its serving gNB.
* Change “SL-QoS-Profile-r17” to “SL-QoS-Profile-r16” and “maxNrofSL-QFIs-r17” to maxNrofSL-QFIs-r16” (clause 6.3.5[5]). Remove “Editor’s note 4: FFS how to implement SL-QoS-Profile-r17.”
* Put IE “sl-DRX-Config” under a new IE of SL-PHY-MAC-RLC-Config-v17xy, further put this new IE of SL-PHY-MAC-RLC-Config-v17xy under SL-ConfigDedicatedNR; add one EN “FFS extension marker for SL-PHY-MAC-RLC-Config-v17xy is needed or not”.
* To place default DRX Configuration for GC/BC outside the “SL-DRX-GC-BC-PerQoS-List-r17. Remove the current Boolean indicator “sl-DefaultDRX-GC-BC-r17” from the current version.
* Agreements on stage 3 open issues for MAC running CR:
* Priority value of sidelink DRX Command MAC CE is a fixed value (i.e., “1”).
* Agreements on SL-DRX for ProSe:
* RAN2 confirm R17 SL-DRX design can support non-relay-related ProSe communication directly without additional specific solution discussion / specification effort.
* RAN2 confirm the R17 SL-DRX design can support non-relay-related ProSe discovery by reusing SL default-DRX configuration used for communication without further additional specific solution discussion / specification effort.
* RAN2 confirms Rel-17 SL-DRX design can be reused for relay-related ProSe communication in layer-3 relay without additional specific solution discussion/specification effort.
* Keep RAN2 previous agreement (prioritize the non-relay case without consideration of relay specific optimization in Rel-17) but we’re not going to make any conclusion if L2 relay-related ProSe communication is supported or not in Rel-17 now.
* RAN2 confirms Rel-17 SL-DRX design can be reused for L3 relay-related ProSe discovery without additional specific solution discussion/specification effort (by applying SL default-DRX configuration). No conclusion if L2 relay-related ProSe discovery is supported or not in Rel-17 now. RAN2 does not specify any restriction now.
* Will include the agreement above in addition to all other related agreements made last week and from this offline discussion into the response LS to SA2.
* Agreements on HARQ RTT:
* RAN2 confirms the working assumption: “SL HARQ RTT timer can be derived from the retransmission resource timing when the SCI indicates a retransmission resource”.
* One-to-one mapping is needed between Tx and Rx resource pools for derivation of SCI-based RTT timer. We do not need to specify it.
* In case RAN2 pursue the SCI based RTT timer, UE only use the immediately next retransmission resource indicated in SCI to derive a single RTT value.
* Agreements on SL DRX for mode 1:
* For the issue that a mode-1 SL grant being provided by network to Tx-UE yet it is not in SL active time of any destination that has data to be sent, for initial transmission, drop the grant. FFS if any spec change.
* For the issue that a mode-1 SL grant being provided by network to Tx-UE yet it is not in SL active time of any destination that has data to be sent, for retransmission, drop the grant.
* Agreements on identified FFSs:
* The onduration timer should be included in the RX UE’s desired SL DRX configuration.
* The DRX start offset should be included in the RX UE’s desired SL DRX configuration.
* The DRX cycle should be included in the RX UE’s desired SL DRX configuration.
* When TX UE doesn’t receive any assistance information from RX UE, TX UE considers that RX UE is ok with any DRX configuration (including no DRX configuration).
* For GC, when performing the down-selection of the inactivity timer, select the inactivity timer whose inactivity timer length is the largest one (among multiple ones for the corresponding L2 id) as the selected inactivity timer.
* Common default SL DRX configuration should be used for BC/GC.
* The default SL DRX configuration for BC/GC can be used for the DCR message. FFS for UC (at least for the initial message).
* RAN2 confirms that DRX configuration for V2X group management signaling is out of RAN2 scope. No additional new mechanism is needed.
* A Tx profile identifies one or more sidelink feature groups.
* When sl-PUCCH-Config is configured but the PUCCH is not transmitted e.g. due to UL/SL prioritization, the starting timing of SL-specific drx-HARQ-RTT-Timer is referring to symbol.
* RAN2 agree to revise the agreement made in RAN2#114-e as below:
* “When sl-PUCCH-Config is configured (and the PUCCH is transmitted), the UE should start the SL-specific drx-HARQ-RTT-Timer in Uu for the corresponding SL HARQ process in the first slot symbol after the end of the corresponding transmission carrying the SL HARQ feedback via the PUCCH.”
* In case of SL-specific drx-HARQ-RTT-Timer is not supported but to support SL-specific drx-RetransmissionTimer, the starting timing of SL-specific drx-RetransmissionTimer is referring to symbol.
* It is up to Rx UE’s implementation to determine its desired SL DRX configuration.
* The SL DRX assistance information request from Tx UE to Rx UE is not supported in the current release.
* Working assumption: Option2 (Need of down-selection for DRX cycle and on-duration) for GC/BC when multiple QoS profiles are associated with the same DST L2 ID.
* Agreements on DRX timer length and start time:
* For UC/GC/BC, the units of Uu DRX timers are taken as baseline for the following SL-DRX parameters:
	+ - sl-drx-LongCycle and sl-drx-StartOffset in millisecond.
		- sl-drx-onDurationTimer in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond).
		- sl-drx-SlotOffset in multiples of 1/32 ms.
		- sl-drx-InactivityTimer in multiple integers of 1 ms.
* For unicast/groucast/broadcast, for sl-drx-HARQ-RTT-Timer, the granularity of starting time is at slot-level and the length is also configured in number of slots.
* For unicast/groucast/broadcast, for sl-drx-RetransmissionTimer, the granularity of starting time is at slot-level and the length is also configured in number of slots.
* The SL DRX timers should be calculated in the unit of physical slot. FFS whether the case may happen that no SL slots are available in UE’s active time and whether/how to solve it.
* Similar to Uu, the start of SL-DRX cycle is calculated by the following formula:

[(DFN × 10) + subframe number] modulo (sl-drx-Cycle) = sl-drx-StartOffset

* For unicast, for CONNECTED TX UE, RAN2 confirms that sl-drx-StartOffset and sl-drx-SlotOffset are configured to RX UE by TX UE based on gNB configuration.
* For unicast, for IDLE/INACTIVE/OOC TX UE, RAN2 confirms that sl-drx-StartOffset and sl-drx-SlotOffset are configured to RX UE by TX UE implementation.
* For groucast and broadcast, an equation is introduced to derive sl-drx-startoffset based on DST L2 ID.
* RAN2 to select one of the following options to determine the sl-drx-startoffset:
	+ - Option-1:
			* n=DST L2 ID MOD N, where N is the total number of sl-drx-startoffset values, and n is an index in the N sl-drx-startoffset values.
		- Option-5:
			* sl-drx-StartOffset (ms) = DST L2 ID MOD sl-drx-LongCycle (ms)
			* FFS: sl-drx-SlotOffset
* For groucast and broadcast, sl-drx-SlotOffset is also set based on DST L2 ID (i.e., similar to sl-drx-StartOffset).
* Agreements on need of additional new considerations:
* A new MAC CE to indicate DRX operation suspend/resume is not supported in Rel-17 (related to R2-2109722).
* SL DRX configuration for SL groupcast including multiple settings for the SL DRX ON duration is not supported in Rel-17 (related to R2-2109812).
* Inactivity timer maintenance rules for groupcast transmissions with MCR is not supported in Rel-17 (related to R2-2109937).
* 4a. In Rel-17, RX UE filtering based on SL-DRX shall not be specified and enforced. RX UE is allowed to receive and process incoming traffic which does not exactly match SL DRX configurations (related to R2-2110062).
* 4b. RAN2 to confirm that no specification change is needed for supporting 4a.
* For GC, number of group members does not need to be considered in the determination of SL DRX on-duration and inactivity timers in the scenario where the UE knows it in Rel-17 (related to R2-2110938).
* An SL UE capability, representing the amount of time a UE needs to process SL grant and prepare data transmission, is not needed to be indicated by the UE to its serving gNB (related to R2-2111119).
* RAN2 to confirm that no specification change is needed for indicating SL traffic characteristics and associated QoS requirement to the SL TX UE’s gNB for determining SL DRX On duration.
* Agreements on SL DRX for SL CSI reception:
* Confirm the WA: The slots when the UE is expected CSI report following a CSI request is considered as SL active time.
* Active time for SL-CSI reception is defined with description. Active time includes the time between SL-CSI request is sent and SL-CSI report reception or period of sl-LatencyBound-CSI-Report.
* Ambiguous time is not introduced on sidelink for SL-CSI report.
* Agreements on candidate resource selection and HARQ RTT:
* TX UE shall select initial transmission resource only in the RX UE’s active time where SL DRX timers are running now or will be running in future (at least on-duration timer). Further details of active time can be considered later. FFS on spec impact.
* If RAN 2 agrees that TX UE shall select initial transmission resource only in the RX UE’s active time, it is applied for all cast types.
* For each SL grant, the grant is used if it is in active time of at least one destination; otherwise the grant is skipped.
* Regardless whether HARQ feedback is enabled or disabled, the HARQ RTT timer can be derived based on the resource assignment information for retransmission of the same TB in the SCI if the resource assignment information for retransmission of the same TB is present.
* When HARQ feedback is disabled, either zero value or non-zero value can be configured for the HARQ RTT timer if the resource assignment information is not present. FFS on details of configuration.
* Always set the value of the retransmission timer to be a configured value regardless how the UE sets the HARQ RTT timer.
* MAC indicates the active time information to PHY.
* It is up to RAN1 to select an option.
* We will send LS to inform RAN1 of the related agreements from this offline discussion [706]

#### 2.2.2 Remaining Open issues

The followings are the remaining open issues:

* Protocol layer aspects on sidelink DRX for broadcast, groupcast, and unicast including;
	+ Details of timer for unicast/groupcast/broadcast
	+ Details of mechanism aiming to align sidelink DRX wake-up time among the UEs communicating with each other
	+ Details of mechanism aiming to align sidelink DRX wake-up time with Uu DRX wake-up time in an in-coverage UE
	+ Details of TX profile for groupcast/broadcast
	+ Details of resource selection and LCP procedures considering SL DRX active time
* Protocol layer aspects on resource allocation to reduce UE’s power consumption.
* Protocol layer aspects on solution(s) on enhancement(s) in mode 2 for enhanced reliability and reduced latency.

## 2.3 RAN3

#### 2.3.1 Agreements

#### 2.3.2 Remaining Open issues

## 2.4 RAN4

#### 2.4.1 Agreements

**RAN4#101-e: RF**

RAN4 agreed 5 WFs, 2 reply LSs and updated TR 38.785 v0.4.0 for SL enhancements in Rel-17 as follows:

* **New SL enhancement RF requirements:**
	+ Based on RAN4 agreed with 2 WFs and summary papers, we provide detail results as follows:
		- **WF on Pcmax revision in NR V2X UE in Rel-16 (R4-2119981)**
			* Issue 1-1-1: Pcmax definition of V2X UE for single carrier in TS38.101-1 in Rel-16 & Rel-17
			* Agreement
				+ For the total transmitted power PCMAX,PSSCH/PSCCH , PEMAX,c is the value given by IE A, defined by TS 38.331, when the UE is not associated with a serving cell on the NR V2X carrier .

FFS on IE A

Option 1: sl-Tx-Power

Option 2: sl-MaxTransPower

* + - * + When the UE is associated with a serving cell on the NR V2X carrier, PEMAX,c is given by IE B of that serving cell.

FFS on IE B

Option 1: sl-Tx-Power

Option 2: sl-MaxTransPower

Option 3: p-Max

* + - * + IE A and IE B can be the same.
				+ Send LS to RAN1 and RAN2 to check which signaling is proper one to be used.
			* Issue 1-1-2: Pcmax definition of V2X UE for inter-band V2X UE in TS38.101-1 in Rel-16
			* Agreement
				+ Option 2: For the inter-band V2X UE in TS38.101-1 in Rel-16, the power class for inter-band V2X UE only supported with PC3, so RAN4 can keep the current configured Tx power for inter-band V2X UE in Rel-16.
				+ Further discuss whether to introduce PC2 inter-band concurrent operation in Rel-17 and if the Pcmax needs to be revisited correspondingly
			* Issue 1-1-3: Pcmax definition of V2X UE for intra-band V2X UE in TS38.101-3 in Rel-16
			* Agreements
				+ Option 2: Based on Huawei paper (R4-2119536), RAN4 update the configured Tx power for intra-band V2X UE in Rel-16.
			* Issue 1-1-4: Pcmax definition of V2X UE for inter-band V2X UE in TS38.101-3 in Rel-16
			* Agreements
				+ Option 2: For the inter-band V2X UE in TS38.101-1 in Rel-16, the power class for inter-band V2X UE only supported with PC3, so RAN4 can keep the current configured Tx power for inter-band V2X UE in Rel-16.
				+ Further discuss whether to introduce PC2 inter-band concurrent operation in Rel-17 and if the Pcmax needs to be revisited correspondingly
		- **WF on NR PS REFSENS requirements for SL enhancement UE in n14 (R4-2119982)**
			* Issue 1-2-1: REFSENS for n14 SL Enhancement UE
			* Agreements
				+ Option 2: Same RB of NR Uu for SL transmission configuration will consider to derive REFSENS requirements in n14 SL enh. UE
			* Issue 1-3-1: REFSENS equation for n14 SL Enhancement UE
			* Agreements
				+ Option 2: NR SLREFSENS = NR UuREFSENS + ∆SNR**SL-Uu** + ∆IL**UL-DL** + 10log10(∆LCRB/NRB)
				+ Detail REFSENS Tables

Table 8.2.1-1: Reference sensitivity for NR SL enhancement (PC5)

|  |
| --- |
| NR Operating band / SCS / Channel bandwidth / Duplex-mode |
| V2X Band | SCSkHz | 5MHz(dBm) | 10MHz(dBm) | 20MHz(dBm) | 30MHz(dBm) | 40MHz(dBm) | Duplex Mode |
| n14 | 15 | [-95.9] | [-92.7] |  |  |  | HD |
| 30 |  | [-93.0] |  |  |  |
| 60 |  |  |  |  |  |

Table 8.2.1-2: Sidelink Tx configuration for REFSENS of NR SL enhancement (PC5)

|  |
| --- |
| NR operating Band / SCS/ Channel bandwidth / NRB / Duplex mode |
| V2X Band | SCS (kHz) | 5 MHz(dBm) | 10 MHz(dBm) | 20 MHz(dBm) | 30 MHz(dBm) | 40 MHz(dBm) | Duplex Mode |
| n14 | 15 | 20 | 20 |  |  |  | HD |
| 30 |  | 10 |  |  |  |
| 60 |  |  |  |  |  |

* + - * + RAN4 further discuss whether allow the additional 0.5 dB IM when small RB (RB size ≤ 24) is allocated in n14 or not.
		- **Updated TR38.785 v0.4.0 was agreed (R4-2118081)**
			* RAN4 captured as following approved TPs
				+ TP for SL enhancements
				+ TP on Updating REFSENS requirements for NR SL enhancement
				+ TP on RF requirements for intra-band con-current V2X operation in licensed band

Add ON/OFF time mask for TSM operation in same carrier

Add the general Tx requirements except configured Tx power for intra-band con-current V2X UE in n79

Add the general RF requirements for intra-band con-current V2X UE in n79

* + - **RAN4 agreed to send LS to RAN1/RAN2 for IE of Pemax in both licensed band and ITS spectrum (R4-2120047)**
			* Issue 1: It is RAN4 understanding that the parameter to limit the transmitted power of PSSCH/PSCCH for V2X can be used in both in-coverage and out-of-coverage. RAN4 would like to check with RAN1 and RAN2 which parameter (sl-maxTxPower, sl-MaxTransPower, SL-TxPower) is the correct one to be used to fulfill the purpose?
			* Issue 2: RAN4 also had some discussion on whether the parameter should be associated with or without a serving cell on the NR V2X carrier, and three options are proposed:
* Option 1: The parameter can be associated either with a serving cell or without a serving cell, and it can be configured separately with p-max for Uu
* Option 2: The parameter can be associated either with a serving cell or without a serving cell, when the parameter is associated with a serving cell, PEMAX,c is the smaller value given by this parameter for SL and p-max for Uu of that serving cell.
* Option 3: when UE is associated with a serving cell on the NR V2X carrier, p-max is used for serving cell c; when the UE is not associated with a serving cell on the NR V2X carrier, the parameter given for SL in RAN2 specification is used.
* RAN4 would like to check which option is aligned with the RAN1 and RAN2 specification.
* **Left over issue:**
	+ **Supporting PC2 NR SL UE RF requirements**
		- Way forward on High power UE for NR V2X (R4-2119991)
			* Issue 1-1: PC2 HPUE capability for single band
			* Agreements
				+ For sidelink, define specific NR V2X power class capability, e.g., PC2 and PC3.

Capability signaling is per band

On licensed band, PC1.5 and PC5 are not considered for NR V2X.

* + - * Issue 1-2: PC2 HPUE capability for intra-band con-current band combinations
			* Agreements
				+ Need to introduce per band combination power class capability for NR V2x intra-band con-current operation
		- Send LS to RAN2 to introduce HPUE capability signaling for NR V2X UE
			* An LS should be sent to RAN2 on the RAN4 agreements for per band power class capability and the per BC power class capability for intra-band con-current operation.
		- Co-channel coexistence issues
			* Check whether the identified co-channel existence issue exists, the following aspects should be considered
				+ Whether the licensed band and frequency should be used for NR-V out-of-coverage scenario?
				+ If this is an issue, should the co-channel co-existence in this case need to be guaranteed by RAN4 requirements?
	+ **Supporting intra-band con-current V2X operation in licensed band**
		- Way forward on RF requirements and sync. Issues for Intra-band V2X con-current operation (R4-2119988)
			* Issue 1-1-1: Different cases for switching time mask
				+ Agreements: To consider such cases for switching time mask:

Case A: Same bandwidth with same carrier frequency

Case B: Different bandwidths with same carrier frequency

Case C:

Same bandwidth with different carrier frequency

Different bandwidth with different carrier frequency

Define one time mask requirement for Case A and one time mask requirement for Case B and Case C

Requirement with case A is not mandated if the switching time for case A is smaller than Case B.

* + - * Issue 1-1-2: Switching time mask for same carrier
				+ Agreement: For switching time mask for Case A, consider two transient periods 10us+10us for all SCS, and further discuss whether TA should be included or not.
			* Issue 1-1-3: Switching time for different carriers
				+ Agreement: RF switching time is different from PUSCH/PSSCH preparation time.

Further discuss whether the RF switching time occurs after PSSCH/PUSCH preparation time or simultaneously with PSSCH/PUSCH preparation time. If RAN4 agree RF switching time is separate from preparation time and can occur either sequentially or simultaneously to the preparation time, the switching time, i.e. 140us can be agreed.

Further discuss whether to indicate TA difference as specified in issue 1-1-2 in switching time mask.

* + - * Issue 1-4-1: REFSENS in n79
				+ Agreement:

Option 1: To define the REFSENS requirements for intra-band con-current V2X operation in n79 (LG paper R4-2112769).

These REFSENSE values do not consider impairments due to near/far issue the impact of which is FFS.

* + - * Issue 2-1-1: SL transmission timing
				+ Agreements:

[Align SL transmission with DL timing

Add note in TS or TR that for some scenario there will be interference]

Option 1: Capture the note for interference problems in TR38.785.

Option 2: Capture the note for interference problems in TS38.101-1.

Agree following RAN1 Rel-16 specification for NTA-offset in RF session.

If RAN1 impact is identified, revisit this agreement

* + - Way forward on MPR for intra-band con-current V2X operation (R4-2119989)
			* Re-evaluate MPR requirements for both PC3 and PC2 intra-band con-current V2X operation in n79.
			* Refer the MPR simulation assumptions in section 5.2.4.2.2 in TR38.785
			* Additional simulation points
				+ Consider different modulation order between NR SL and NR Uu
				+ Worst RB allocation is 1RB for NR Uu + 10RBs for NR SL in outer/edge case
			* After re-evaluation (simulation and/or measurement results), RAN4 can further check if one of the options on MPR could be adopted for NR intra-band con-current V2X operation in next RAN4 meeting
				+ Option 1

MPRCon-current = MAX(MPRsingle,NR, MPRV2X, MPRUu\_SL\_Intraband in TR 38.785 )

* + - * + Option 2

MPRCon-current = MPRV2X + same delta value between NR Uu UL CA and single carrier

* + - * + Option 3: MPRCon-current = MPRUu\_SL\_Intraband
				+ Option 4: other is not precluded

**RAN4#101-e: RRM**

RAN4 agreed 1 WF for RRM as follows:

* **WF on RRM requirements**
	+ Related to new operating scenario (intra-band con-current operation)
		- NTA\_offset & NTA,SL when NR Cell is configured as synchronization reference source
			* Consider that SL NTA\_offset = UL NTA\_offset & NTA,SL = 0
		- Scheduling restriction calculation when switching TDM based intra-band con-current SL operation
			* Define the scheduling availability requirements based on one slot as baseline
				+ If RF’s decision on the switching time impacts on it, it will be revisited.
		- Scheduling restriction location when switching TDM based intra-band con-current SL operation
			* Reuse the principle defined in section 12.9.1 of TS38.133 for transmission switching between SL and Uu (No priority rules in RRM requirements, which are specified by covering all possible cases)
		- Interruption on SL due to Uu BWP switch for FDM based intra-band con-current SL operation
			* Interruption on SL due to Uu BWP switch for FDM based intra-band con-current SL operation
				+ Define interruption similar to the interruption of NR intra-band CA/DC
	+ Related to SL-DRX
		- SLSS measurement per SL-DRX cycle
			* For initialize/cease of SLSS transmission requirement
				+ Define requirement based on the assumption that UE performs one SLSS measurement per SL-DRX cycle
			* For PSBCH-RSRP measurement requirement for selection/reselection of V2X sync reference source
				+ Define requirement based on the assumption that UE performs one SLSS measurement per SL-DRX cycle
			* For SLSS search for selection/reselection of V2X sync reference source
				+ Option 1 : Not be restricted due to SL-DRX
				+ Option 2: FFS
		- RRM requirements when multiple SL-DRX cycles are configured
			* Consider a shortest SL-DRX cycle as baseline
			* FFS transitions due to the possible changes of selected DRX cycle
		- Initiation/cease of SLSS transmissions due to SL-DRX when GNSS/NR Cell /EUTRAN Cell is synchronization reference source
			* Reuse Rel-16 evaluation period requirement
		- Initiation/cease of SLSS transmissions due to SL-DRX when SyncRef UE is synchronization reference source
			* Define the evaluation time Tevaluate,SLSS = 4 x max(S-SSB periods, SL-DRX)
		- PSBCH-RSRP measurement period
			* Max (320ms, 2 x SL-DRX)
		- UE Rx(Data) drop rate requirements for Asynchronized SLSS measurement & search
			* FFS
				+ Option 1 : Reuse Rel-16 requirements (a maximum of 0.3% of its Data reception during Tdetect,SyncRef UE\_V2X )
				+ Option 2 : Discuss how to calculate dropping rate with SL-DRX
		- SyncRef UE detection time (Tdetect,SyncRef UE\_V2X) for Asynchronized SLSS measurement & search
			* max(8s, [X] SL-DRX cycles), X = FFS
		- UE Tx(SLSS) drop rate requirements for Synchronized SLSS measurement & search
			* Reuse Rel-16 requirements (a maximum of 30% of its SLSS transmissions during Tdetect,SyncRef UE\_V2X )
				+ Based on assumption that both SLSS transmission and SLSS search are allowed during SL-DRX on duration or SL-DRX off duration
		- SyncRef UE detection time (Tdetect,SyncRef UE\_V2X) for Synchronized SLSS measurement & search
			* Reuse Rel-16 requirement(1.6s)
		- UE Tx(Data & SLSS) drop rate requirements for Asynchronized SLSS measurement & search
			* For SLSS drop
				+ Allow Tx dropping at most in an aggregated window of 480ms during Tdetect,SyncRef UE\_V2X async search.
			* For Data drop
				+ Allow Tx dropping at most in an aggregated window of 480ms during Tdetect,SyncRef UE\_V2X async search.
		- Conditional SyncRef UE detection requirements for Asynchronized SLSS measurement & search
			* Consider conditional SyncRef UE detection requirements for Asynchronized SLSS measurement & search
				+ Option 1

UE can skip asynchronized SyncRef UE search to save power when the following conditions are all satisfied over an evaluation period:

SLSS RSRP is larger than a threshold

SLSS RSRP variation is lower than a threshold. The SLSS RSRP variation is the average value of (instantaneous RSRP - current filtered RSRP)^2 during the evaluation period

Data connection is maintained with the current SyncRef UE source

The evaluation period is the same as SLSS Tx initiation/cease evaluation period when SLSS is the synchronization source

* + - * + Option 2 : FFS
		- Interruption to WAN due to SL-DRX
			* FFS : Define interruption requirements when NR SL is in SL-DRX but NR is in non-DRX
				+ The current interruptions at transitions between active and non-active during DRX for EN-DC can be used as baseline
			* FFS : when SL is for V2X communication, interruptions shall be avoided on WAN during
				+ reception of paging,
				+ reception of system information,
				+ while onDurationTimer is running
		- Interruption length on WAN due to SL-DRX
			* FFS : Consider table 8.2.1.2.1-1 in TS 38.133 as baseline
				+ Table 8.2.1.2.1-1 (TS38.133): Interruption length X at transition between active and non-active during DRX

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X (slots) |
|  | length (ms) | Sync | Async |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 1 | 2 |
| 2 | 0.25 | 3 |
| 3 | 0.125 | 5 |

* + - Allowed probability of missed Ack/Nack on WAN due to SL-DRX
			* FFS: As baseline, allow up to [1] % probability of missed ACK/NACK when the [configured SL-DRX cycle] is less than 640ms, and up to [0.625] % probability of missed ACK/NACK when the configured [configured SL-DRX cycle] is 640ms or longer. FFS when multiple SL-DRX cycles are configured
		- Interruption to SL due to Uu DRX
			* For interruption requirement on SL due to Uu DRX, reuse the interruptions requirements for EN-DC defined in section 8.2.1 without CA.
			* Consider test in performance part.
		- Interruption length on SL due to Uu-DRX
			* Consider table 8.2.1.2.1-1 in TS 38.133 as baseline
		- Allowed probability of missed Ack/Nack on SL due to Uu-DRX
			* As baseline, allow up to [1] % probability of missed ACK/NACK when the [configured Uu-DRX cycle] is less than 640ms, and up to [0.625] % probability of missed ACK/NACK when the configured [configured Uu-DRX cycle] is 640ms or longer
		- Interruption to WAN due to SyncRef UE detection and/or Sensing during SL DRX off duration
			* FFS
				+ Option 1: Consider interruption requirement similar to SL-DRX transition
				+ Option 2: Not consider interruption requirement as NR Uu case (search to receive SSB outside of Uu DRX on duration)
	+ Related to L1-RSRP
		- L1-RSRP measurement for partial sensing
			* Encourage companies to provide their view in next meeting
		- L1-RSRP measurement for inter-UE coordination
			* Encourage companies to provide their view in next meeting

#### 2.4.2 Remaining Open issues

**RF**:

RAN4 will study and specify the above leftover issues and new SL enhancement RF requirements based on operator requested SL operating bands.

* Define operating bands and related RF core requirements for SL enhancement operation
	+ PC1/PC3 in n14 PS UE will be introduce when RAN4 complete the related RF requirements for SL enhancement UE.
* Define PC2 UE RF requirements in licensed band/unlicensed band
	+ RAN4 will specify PC2 UE RF requirements in licensed band based on operator request
		- Single band PC2 V2X UE in n47
		- Inter-band con-current PC2 V2X operation: Encourage to propose the PC2 V2X band combinations
		- Intra-band con-current PC2 V2X operation: Encourage to propose the PC2 intra-band V2X operation
* For the intra-band con-current operation between NR SL and NR Uu operation in licensed band, RAN4 will further discuss the configured Tx power for intra-band contiguous/non-contiguous con-current V2X operation in licensed band. Also related RF requirements will be specified such as ON/OFF time mask in different carrier and others.

**RRM**:

* Related to SL-DRX
	+ SLSS measurement per SL-DRX cycle
		- For SLSS search for selection/reselection of V2X sync reference source
			* Option 1 : Not be restricted due to SL-DRX
			* Option 2: FFS
	+ UE Rx(Data) drop rate requirements for Asynchronized SLSS measurement & search
		- FFS
			* Option 1 : Reuse Rel-16 requirements (a maximum of 0.3% of its Data reception during Tdetect,SyncRef UE\_V2X )
			* Option 2 : Discuss how to calculate dropping rate with SL-DRX
	+ Interruption to WAN due to SL-DRX
		- FFS : Define interruption requirements when NR SL is in SL-DRX but NR is in non-DRX
			* The current interruptions at transitions between active and non-active during DRX for EN-DC can be used as baseline
		- FFS : when SL is for V2X communication, interruptions shall be avoided on WAN during
			* reception of paging/reception of system information/while onDurationTimer is running
	+ Interruption length on WAN due to SL-DRX
	+ Allowed probability of missed Ack/Nack on WAN due to SL-DRX
	+ Interruption to WAN due to SyncRef UE detection and/or Sensing during SL DRX off duration
* Related to L1-RSRP
	+ RSRP measurement for partial sensing
	+ RSRP measurement for inter-UE coordination

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SA2

#### 3.1.0 SA2 eV2XARC\_Ph2 status – general

SA2 has progressed normative work on eV2XARC\_Ph2 (Architecture enhancements for 3GPP support of advanced V2X services – Phase 2) to specify support of QoS aware NR PC5 power efficiency for pedestrian UEs in TS 23.287 based on the RAN2 LS on Tx Profile and the agreements made for sidelink DRX in RAN2.

The completion level of eV2XARC\_Ph2 is 100%.

#### 3.1.1 Agreements with cross-TSG impacts

At SA2#147E (18 – 22 October, 2021), Reply LS on Tx Profile was sent to RAN2 (Cc: CT1): S2-2107840.

The two CRs to TS 23.287 were approved at SA2#148E (16 – 22 November, 2021): S2-2108301, S2-2109103 (revision of S2-2107841 approved at SA2#147E).

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

No issue that has critical dependency with RAN2 was identified.

## 3.2 CT WGs

#### 3.2.0 CT WGs eV2XARC\_Ph2 status – general

CT1 has progressed normative work on eV2XARC\_Ph2 (CT aspects of Architecture enhancements for 3GPP support of advanced V2X services – Phase 2) to specify support of PC5 DRX operation in TS 24.587 based on the stage 2 requirements.

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

 04.10.2021 minor adaptations for RAN #94e

 08.08.2021 minor adaptations for RAN #93e

 17.05.2021 minor adaptations for RAN #92e

 28.01.2021 minor adaptations for RAN #91e

 09.11.2020 minor adaptations for RAN #90e

 31.08.2020 minor adaptations for RAN #89e

 20.04.2020 minor adaptations for RAN #88e

 18.02.2020 minor adaptations for RAN #87e

 14.11.2019 minor adaptations for RAN #86

 18.08.2019 minor adaptations for RAN #85

 12.05.2019 minor adaptations for RAN #84

 27.02.2019 minor adaptations for RAN #83

 21.11.2018 completion levels with colours added (for RAN #82)

v04.81 31.07.2018 simplification of template and addition of cross-TSG aspects (for RAN #81)

v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

v04.75 31.01.2017 minor adaptations for RAN #75

v04.74 28.10.2016 minor adaptations for RAN #74

v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

v04.70 30.10.2015 minor adaptations for RAN #70

v04.69 12.08.2015 minor adaptations for RAN #69

v04.68 21.05.2015 minor adaptations for RAN #68

v04.67 01.02.2015 minor adaptations for RAN #67

v04.66 16.11.2014 minor adaptations for RAN #66

v04.65 16.08.2014 minor adaptations for RAN #65

v04.64 22.05.2014 minor adaptations for RAN #64

v04.63 24.01.2014 restructuring for RAN #63 to cover Core & Perf. in one doc file

v03.62 11.11.2013 section 1.2.3 adapted for RAN #62

v03 11.08.2013 section 1.2.3 added on time budget

v02 07.05.2010 history added, some spelling corrections

v01 13.11.2009 First version of the template

**RAN1#106bis-e**

1. R1-2108763 Sidelink resource allocation to reduce power consumption Huawei, HiSilicon
2. R1-2108764 Inter-UE coordination in sidelink resource allocation Huawei, HiSilicon
3. R1-2108800 Power consumption reduction for sidelink resource allocation FUTUREWEI
4. R1-2108801 Discussion on techniques for inter-UE coordination FUTUREWEI
5. R1-2108818 Resource allocation for power saving Nokia, Nokia Shanghai Bell
6. R1-2108819 Inter-UE coordination for Mode 2 enhancements Nokia, Nokia Shanghai Bell
7. R1-2108924 Discussion on sidelink resource allocation for power saving Spreadtrum Communications
8. R1-2108925 Discussion on inter-UE coordination in sidelink resource allocation Spreadtrum Communications
9. R1-2108998 Resource allocation for sidelink power saving vivo
10. R1-2108999 Discussion on mode-2 enhancements vivo
11. R1-2109000 Other aspects on SL enhancements vivo
12. R1-2109036 Considerations on partial sensing and DRX in NR Sidelink Fujitsu
13. R1-2109037 Considerations on inter-UE coordination for mode 2 enhancements Fujitsu
14. R1-2109059 Discussion on power saving in NR sidelink communication OPPO
15. R1-2109060 Inter-UE coordination in mode 2 of NR sidelink OPPO
16. R1-2109061 Wake up signal for NR sidelink OPPO
17. R1-2109129 Discussion on resource allocation for power saving NEC
18. R1-2109130 Discussion on mode 2 enhancements NEC
19. R1-2109142 Inter-UE coordination for enhanced resource allocation Mitsubishi Electric RCE
20. R1-2109191 Further discussion on sidelink resource allocation enhancements for power saving CATT, GOHIGH
21. R1-2109192 Discussion on Inter-UE coordination for Mode 2 enhancements CATT, GOHIGH
22. R1-2109193 Discussion on SL DRX configuration granularity CATT, GOHIGH
23. R1-2109300 Discussion on resource allocation for power saving CMCC
24. R1-2109301 Discussion on inter-UE coordination for mode 2 enhancement CMCC
25. R1-2109341 Feasibility and benefits for NR Sidelink mode 2 enhancements CEWiT
26. R1-2109348 Considerations on partial sensing mechanism of NR V2X CAICT
27. R1-2109349 Considerations on mode 2 enhancements CAICT
28. R1-2109384 Discussion on sidelink resource allocation enhancement for power saving Xiaomi
29. R1-2109385 Discussion on inter-UE coordination Xiaomi
30. R1-2109386 Discussion on other design aspects for sidelink enhancement Xiaomi
31. R1-2109430 NR Sidelink Resource Allocation for UE Power Saving Fraunhofer HHI, Fraunhofer IIS
32. R1-2109431 Resource Allocation Enhancements for Mode 2 Fraunhofer HHI, Fraunhofer IIS
33. R1-2109449 Discussion on inter-UE coordination for mode 2 enhancements Zhejiang Lab
34. R1-2109450 Discussion on inter-UE coordination for Mode 2 enhancements Hyundai Motors
35. R1-2109512 On Resource Allocation for Power Saving Samsung
36. R1-2109513 On Inter-UE Coordination for Mode2 Enhancements Samsung
37. R1-2109514 Discussion on Sidelink Enhancement Samsung
38. R1-2109541 Sidelink resource allocation for power saving Lenovo, Motorola Mobility
39. R1-2109542 Inter-UE coordination for Mode 2 enhancements Lenovo, Motorola Mobility
40. R1-2109564 Remaining issues on sidelink power saving MediaTek Inc.
41. R1-2109586 Discussion on Mode 2 enhancements MediaTek Inc.
42. R1-2109631 Sidelink Resource Allocation Schemes for UE Power Saving Intel Corporation
43. R1-2109632 Solutions for sidelink communication with inter-UE coordination feedback Intel Corporation
44. R1-2109699 Discussion on sidelink resource allocation for power saving NTT DOCOMO, INC.
45. R1-2109700 Resource allocation for reliability and latency enhancements NTT DOCOMO, INC.
46. R1-2109731 Discussion on Sidelink Resource Allocation for Power Saving Panasonic Corporation
47. R1-2109732 Discussion on resource allocation for power saving ZTE, Sanechips
48. R1-2109734 BWP configuration for power saving ZTE, Sanechips
49. R1-2109754 Physical layer impacts of sidelink DRX Huawei, HiSilicon
50. R1-2109758 Inter-UE coordination for Mode 2 enhancements Panasonic Corporation
51. R1-2109800 Discussion on sidelink resource allocation for power saving Sony
52. R1-2109801 Discussion on inter-UE coordination for Mode 2 enhancements Sony
53. R1-2109818 Discussion on resource allocation for power saving ETRI
54. R1-2109819 Discussion on inter-UE coordination for Mode 2 enhancements ETRI
55. R1-2109852 Discussion on inter-UE coordination ZTE
56. R1-2109860 Discussion on resource allocation for power saving LG Electronics
57. R1-2109861 Discussion on inter-UE coordination for Mode 2 enhancements LG Electronics
58. R1-2109883 Sidelink resource allocation for power saving InterDigital, Inc.
59. R1-2109884 On inter-UE coordination for Mode 2 enhancement InterDigital, Inc.
60. R1-2109885 On gNB-designated resources for inter-UE coordination and sensing in SL DRX InterDigital, Inc.
61. R1-2110005 Discussion on resource allocation for power saving Sharp
62. R1-2110006 Discussion on inter-UE coordination for mode 2 enhancements Sharp
63. R1-2110053 On Sidelink Resource Allocation for Power Saving Apple
64. R1-2110054 On Inter-UE Coordination Apple
65. R1-2110055 Network Assisted Resource Selection Apple
66. R1-2110116 Discussion on NR SL Resource Allocation for Power Saving Convida Wireless
67. R1-2110117 Discussion on Inter-UE Coordination for NR SL Mode 2 Enhancement Convida Wireless
68. R1-2110131 Discussion on partial sensing and SL DRX impact ASUSTeK
69. R1-2110132 Discussion on V2X mode 2 enhancements ASUSTeK
70. R1-2110208 Power Savings for Sidelink Qualcomm Incorporated
71. R1-2110209 Reliability and Latency Enhancements for Mode 2 Qualcomm Incorporated
72. R1-2110305 Resource allocation for power saving in NR sidelink enhancement ITL
73. R1-2110306 Support of inter-UE coordination scheme 1 and scheme 2 ROBERT BOSCH GmbH
74. R1-2110307 Further discussion on power saving for sidelink resource allocation ROBERT BOSCH GmbH
75. R1-2110339 Resource allocation procedures for power saving Ericsson
76. R1-2110340 Details on mode 2 enhancements for inter-UE coordination Ericsson
77. R1-2110341 Additional enhancements to resource allocation procedures Ericsson
78. R1-2110476 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 1st GTW) Moderator (OPPO)
79. R1-2110477 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 2nd GTW) Moderator (OPPO)
80. R1-2110478 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 3rd GTW) Moderator (OPPO)
81. R1-2110479 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 4th GTW) Moderator (OPPO)
82. R1-2110480 FL summary for AI 8.11.1.1 – resource allocation for power saving (EOM) Moderator (OPPO)
83. R1-2110511 Moderator summary for [106bis-e-NR-R17-Sidelink-03] Reply LS to R1-2108710 Moderator (InterDigital)
84. R1-2110586 Reply LS on synchronous operation between Uu and SL in TDD band n79 RAN1, GOHIGH
85. R1-2110593 Summary for email discussion [106bis-e-NR-R17-Sidelink-04] Moderator (CATT)
86. R1-2110648 Feature lead summary for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)
87. R1-2110649 [106bis-e-R17-RRC-Sidelink] Summary of email discussion on Rel-17 RRC parameters for sidelink enhancement Moderator (LG Electronics)
88. R1-2110662 Reply LS on SL resource selection with DRX RAN1, InterDigital
89. R1-2110674 Feature lead summary for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)
90. R1-2110676 Summary of RAN1 agreements for Rel-17 NR sidelink enhancement WI rapporteur (LG Electronics)

**RAN1#107-e**

1. R1-2110844 Sidelink resource allocation to reduce power consumption Huawei, HiSilicon
2. R1-2110845 Inter-UE coordination in sidelink resource allocation Huawei, HiSilicon
3. R1-2110861 Resource allocation for power saving Nokia, Nokia Shanghai Bell
4. R1-2110862 Inter-UE coordination for Mode 2 enhancements Nokia, Nokia Shanghai Bell
5. R1-2110886 Power consumption reduction for sidelink resource allocation FUTUREWEI
6. R1-2110887 Discussion on techniques for inter-UE coordination FUTUREWEI
7. R1-2111036 Remaining issues on resource allocation for sidelink power saving vivo
8. R1-2111037 Remaining issues on mode-2 enhancements vivo
9. R1-2111038 Other aspects on SL enhancements vivo
10. R1-2111111 Discussion on sidelink resource allocation for power saving Spreadtrum Communications
11. R1-2111112 Discussion on inter-UE coordination in sidelink resource allocation Spreadtrum Communications
12. R1-2111121 Discussion on Sidelink Resource Allocation for Power Saving Panasonic Corporation
13. R1-2111150 Considerations on partial sensing and DRX in NR Sidelink Fujitsu
14. R1-2111151 Considerations on inter-UE coordination for mode 2 enhancements Fujitsu
15. R1-2111228 Remaining issues on sidelink resource allocation enhancements for power saving CATT, GOHIGH
16. R1-2111229 Remaining issues on Inter-UE coordination for Mode 2 enhancements CATT, GOHIGH
17. R1-2111300 Discussion on power saving in NR sidelink communication OPPO
18. R1-2111301 Inter-UE coordination in mode 2 of NR sidelink OPPO
19. R1-2111354 Inter-UE coordination for mode 2 enhancements Zhejiang Lab
20. R1-2111406 Discussion on sidelink resource allocation for power saving Sony
21. R1-2111407 Discussion on inter-UE coordination for Mode 2 enhancements Sony
22. R1-2111514 Remaining Details of Sidelink Resource Allocation Schemes for UE Power Saving Intel Corporation
23. R1-2111515 Design of Inter-UE Coordination Solutions for Sidelink Communication Intel Corporation
24. R1-2111546 Discussion on sidelink resource allocation enhancement for power saving Xiaomi
25. R1-2111547 Discussion on inter-UE coordination Xiaomi
26. R1-2111548 Discussion on other design aspects for sidelink enhancement Xiaomi
27. R1-2111625 Discussion on resource allocation for power saving CMCC
28. R1-2111626 Discussion on inter-UE coordination for mode 2 enhancement CMCC
29. R1-2111637 Discussion on resource allocation for power saving ZTE, Sanechips
30. R1-2111639 Other enhancements on power saving ZTE, Sanechips
31. R1-2111649 NR Sidelink Resource Allocation for UE Power Saving Fraunhofer HHI, Fraunhofer IIS
32. R1-2111650 Resource Allocation Enhancements for Mode 2 Fraunhofer HHI, Fraunhofer IIS
33. R1-2111656 Considerations on partial sensing mechanism of NR V2X CAICT
34. R1-2111657 Considerations on mode 2 enhancements CAICT
35. R1-2111667 Discussion on inter-UE coordination ZTE
36. R1-2111699 Discussion on resource allocation for power saving NEC
37. R1-2111700 Discussion on mode 2 enhencements NEC
38. R1-2111758 On Resource Allocation for Power Saving Samsung
39. R1-2111759 On Inter-UE Coordination for Mode2 Enhancements Samsung
40. R1-2111760 Discussion on Sidelink Enhancement Samsung
41. R1-2111815 Discussion on resource allocation for power saving LG Electronics
42. R1-2111816 Discussion on inter-UE coordination for Mode 2 enhancements LG Electronics
43. R1-2111817 Feature lead summary #1 for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)
44. R1-2111818 Feature lead summary #2 for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)
45. R1-2111819 Feature lead summary #3 for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)
46. R1-2111824 Sidelink resource allocation for power saving InterDigital, Inc.
47. R1-2111825 On inter-UE coordination for Mode 2 enhancement InterDigital, Inc.
48. R1-2111826 On gNB-designated resources for inter-UE coordination and sensing in SL DRX InterDigital, Inc.
49. R1-2111827 Inter-UE coordination for enhanced resource allocation Mitsubishi Electric RCE
50. R1-2111894 Sidelink Resource Allocation for Power Saving Apple
51. R1-2111895 Inter-UE Coordination Apple
52. R1-2111896 Network Assisted Resource Selection Apple
53. R1-2111931 Physical layer impacts of sidelink DRX Huawei, HiSilicon
54. R1-2111967 Inter-UE coordination for Mode 2 enhancements Panasonic Corporation
55. R1-2111997 Discussion on resource allocation for power saving ETRI
56. R1-2111998 Discussion on inter-UE coordination for Mode 2 enhancements ETRI
57. R1-2112024 Discussion on resource allocation for power saving Sharp
58. R1-2112025 Discussion on inter-UE coordination for mode 2 enhancements Sharp
59. R1-2112033 On NR Resource Allocation for Power Saving Convida Wireless
60. R1-2112034 Inter-UE Coordination for NR SL Mode 2 Enhancement Convida Wireless
61. R1-2112042 Discussion on partial sensing and SL DRX impact ASUSTeK
62. R1-2112043 Discussion on V2X mode 2 enhancements ASUSTeK
63. R1-2112126 Discussion on sidelink resource allocation for power saving NTT DOCOMO, INC.
64. R1-2112127 Resource allocation for reliability and latency enhancements NTT DOCOMO, INC.
65. R1-2112164 Sidelink resource allocation for power saving Lenovo, Motorola Mobility
66. R1-2112165 Inter-UE coordination for Mode 2 enhancements Lenovo, Motorola Mobility
67. R1-2112167 Candidate resource selection for SL DRX ITL
68. R1-2112237 Power Savings for Sidelink Qualcomm Incorporated
69. R1-2112238 Reliability and Latency Enhancements for Mode 2 Qualcomm Incorporated
70. R1-2112305 Remaining details on sidelink power saving MediaTek Inc.
71. R1-2112318 Discussion on Mode 2 enhancements MediaTek Inc.
72. R1-2112336 Resource allocation for power saving in NR sidelink enhancement ITL
73. R1-2112351 Resource allocation procedures for power saving Ericsson
74. R1-2112352 Details on mode 2 enhancements for inter-UE coordination Ericsson
75. R1-2112353 Additional considerations on resource allocation for power saving and inter-UE coordination Ericsson
76. R1-2112394 Discussion on sidelink enhancements for power saving ROBERT BOSCH GmbH
77. R1-2112396 Remaining details on mode 2 inter-UE coordination ROBERT BOSCH GmbH
78. R1-2112490 Introduction of NR Sidelink enhancements Nokia
79. R1-2112524 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 1st GTW) Moderator (OPPO)
80. R1-2112525 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 2nd GTW) Moderator (OPPO)
81. R1-2112526 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 3rd GTW) Moderator (OPPO)
82. R1-2112527 FL summary for AI 8.11.1.1 – resource allocation for power saving (before 4th GTW) Moderator (OPPO)
83. R1-2112528 FL summary for AI 8.11.1.1 – resource allocation for power saving (EOM) Moderator (OPPO)
84. R1-2112577 Reliability and Latency Enhancements for Mode 2 Qualcomm Incorporated
85. R1-2112649 Feature lead summary #4 for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)
86. R1-2112650 [107-e-R17-RRC-Sidelink] Summary of email discussion on Rel-17 RRC parameters for sidelink enhancement Moderator (LG Electronics)
87. R1-2112756 Feature lead summary #5 for AI 8.11.1.2 Inter-UE coordination for Mode 2 enhancements Moderator (LG Electronics)

**RAN2#116-e**

1. R2-2109323 Reply LS on SL DRX design (R1-2108580; contact: ZTE) RAN1
2. R2-2109324 Reply LS on time gap information in SCI (R1-2108622; contact: OPPO) RAN1
3. R2-2109396 Summary of [POST115-e][714] OPPO
4. R2-2109397 Discussion on R17 SL-DRX applicability to ProSe service OPPO, ZTE, Apple, MediaTek, China Telecom, Spreadtrum, China Mobile, Huawei, HiSilicon
5. R2-2109415 Discussion on DRX left issues OPPO
6. R2-2109416 Discussion on resource allocation enhancement OPPO
7. R2-2109476 SL DRX Configuration Reporting Mechanism for GC/BC CATT
8. R2-2109477 Left issues for Sidelink Unicast DRX CATT
9. R2-2109478 [POST115-e][716][V2X/SL] Identified FFS and open issues (CATT) CATT
10. R2-2109479 Consideration on Resource Allocation Enhancements CATT
11. R2-2109606 RRC running CR for NR Sidelink enhancements Huawei, HiSilicon
12. R2-2109607 Summary of [POST115-e][713][V2X/SL] 38.331 running CR Huawei, HiSilicon
13. R2-2109608 Considerations on sidelink DRX for groupcast and broadcast Huawei, HiSilicon
14. R2-2109609 Remaining issues of the sidelink DRX for unicast Huawei, HiSilicon
15. R2-2109610 Remaining issues of SL communication impact on Uu DRX Huawei, HiSilicon
16. R2-2109643 Discussion on SL DRX Command SHARP Corporation
17. R2-2109719 Discussion on RAN2 impacts for supporting inter-UE coordination Scheme 1 with preferred resource set NEC Corporation
18. R2-2109720 Further discussion on identified FFS/ open issues of unicast sidelink DRX overall flow NEC Corporation
19. R2-2109722 Discussion on DRX suspend/resume mechanism NEC Corporation
20. R2-2109724 DRX Active time, Sensing and Configuration aspects Lenovo, Motorola Mobility
21. R2-2109800 Discussion on remaining issues for SL DRX ZTE Corporation, Sanechips
22. R2-2109801 Further consideration on SL DRX configuration ZTE Corporation, Sanechips
23. R2-2109812 Further issues on SL DRX Nokia, Nokia Shanghai Bell
24. R2-2109813 Discussion on alignment of mode 1 resource allocation and active time of SL Rx UE in SL DRX Nokia, Nokia Shanghai Bell
25. R2-2109847 SL-DRX configuration for Unicast, Broadcast and Groupcast Fraunhofer IIS, Fraunhofer HHI
26. R2-2109907 Remaining aspects of SL DRX Ericsson
27. R2-2109908 Impact analysis between SL DRX and SL relay Ericsson
28. R2-2109936 Resource Allocation Considering DRX InterDigital
29. R2-2109937 Remaining aspects on SL DRX Timers InterDigital
30. R2-2109938 Confirmation of WA on HARQ RTT Based on SCI InterDigital, Apple, Ericsson, Nokia, MediaTek, Fujitsu, Samsung, Sharp, vivo, Huawei, HiSilicon, Qualcomm, Convida, ZTE
31. R2-2109956 Leftover aspects on SL DRX configuration Intel Corporation
32. R2-2109957 On SL DRX alignment Intel Corporation
33. R2-2109958 On resource allocation and inter-UE coordination aspects Intel Corporation
34. R2-2110061 Discussion on remaining issues on SL Impact of Uu-DRX Apple
35. R2-2110062 Discussion on Remaining issues of SL DRX Apple
36. R2-2110063 Discussion on resource allocation enhancements Apple
37. R2-2110106 Discussion on SL-DRX for ProSe vivo, Ericsson, InterDigital Inc, Lenovo, Motorola Mobility, CATT, ASUSTek
38. R2-2110119 Remaining issues on DRX Timers for SL Unicast Spreadtrum Communications
39. R2-2110120 Discussion on resource allocation enhancement for NR sidelink Spreadtrum Communications
40. R2-2110155 Discussion on remaining issues and further consideration on SL DRX LG Electronics France
41. R2-2110156 Power efficient resource allocation and Inter-UE coordination LG Electronics France
42. R2-2110157 Summary of [POST115-e][712][SL] Discussion on stage 3 open issues in 38.321 running CR LG Electronics France
43. R2-2110158 Running CR of TS 38.321 for Sidelink enhancement LG Electronics France
44. R2-2110162 Open issues on TX centric SL DRX LG Electronics France
45. R2-2110223 Discussion on Uu impact Xiaomi
46. R2-2110224 Discussion on Sidelink DRX for unicast Xiaomi
47. R2-2110225 Discussion on Sidelink DRX for broadcast and groupcast Xiaomi
48. R2-2110273 Remaining issues of SL DRX MediaTek Inc.
49. R2-2110316 DRX Active time, Sensing and Configuration aspects Lenovo, Motorola Mobility
50. R2-2110317 Discussion on sidelink resource allocation enhancements Lenovo, Motorola Mobility
51. R2-2110396 Inter-UE Coordination for Sidelink Mode 2 Resource Allocation Fraunhofer IIS, Fraunhofer HHI
52. R2-2110419 Power Reduction for Sidelink Mode 2 Resource Allocation Fraunhofer IIS, Fraunhofer HHI
53. R2-2110650 Remaining issues for sidelink DRX vivo
54. R2-2110651 Discussion on inter-UE coordination for sidelink mode-2 vivo
55. R2-2110680 Summary of [Post115-e][715][SL] Determination of DRX timer length and start time(vivo) vivo
56. R2-2110691 General principles for resource allocation enhancements for SL mode 2 Ericsson
57. R2-2110747 SL data transmission considering SL DRX active time Nokia, Nokia Shanghai Bell
58. R2-2110828 Discussion on inter-UE coordination ZTE Corporation, Sanechips
59. R2-2110937 Further consideration on SL DRX and Uu DRX alignments Samsung Research America
60. R2-2110938 Open issues on SL DRX operation in groupcast Samsung Research America
61. R2-2110940 Resource pool configuration and selection of resource selection mechanism Samsung Research America
62. R2-2111008 Discussion on remaining issues on Sidelink DRX ASUSTeK
63. R2-2111065 Remaining issues for SL DRX timers Lenovo, Motorola Mobility
64. R2-2111119 Discussion on Uu DRX and SL DRX Alignment Qualcomm Finland RFFE Oy
65. R2-2111120 Discussion on Blind Retransmissions with DRX in Mode 1 Qualcomm Finland RFFE Oy
66. R2-2111121 Discussion on RLF and PC5 RRC Connection with SL DRX Qualcomm Finland RFFE Oy
67. R2-2111122 Discussion on pool separation for SL DRX LG Electronics France and ZTE
68. R2-2111177 Draft Reply LS on PC5 DRX for ProSe LG Electronics France
69. R2-2111204 Remaining issues of the sidelink DRX for unicast Huawei, HiSilicon
70. R2-2111220 Reply LS on SL resource selection with DRX (R1-2110662; contact: InterDigital) RAN1
71. R2-2111232 Reply LS on Tx Profile (S2-2107840; contact: LGE) SA2
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73. R2-2111416 Summary of open issues for 38.331 running CR Huawei, HiSilicon (Rapporteur)
74. R2-2111417 RRC running CR for NR Sidelink enhancements Huawei, HiSilicon
75. R2-2111418 Summary of open issues for 38.321 running CR LG Electronics Inc. (Rapporteur)
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77. R2-2111420 [AT116-e][703][V2X/SL] SL-DRX for ProSe (LG) LG
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79. R2-2111422 Summary of [AT116-e][705][V2X/SL] SL DRX for SL-CSI reception Xiaomi
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1. R4-2117405 CR for TS 38.101-1, Correction on configured transmitted power for inter-band V2X concurrent operation (Rel-17) CATT
2. R4-2117406 Discussion and TP on configured transmitted power CATT
3. R4-2117407 Discussion and TP on REFSENS for band n14 CATT
4. R4-2117408 Discussion on time mask for Uu and SL switching CATT
5. R4-2117646 MPR for NR V2X intra-band con-current operation and REFSENS for n79 intra-band concurrent V2X operation Qualcomm Incorporated
6. R4-2117647 n14 REFSENS for PS in licensed band Qualcomm Incorporated
7. R4-2117648 RF switching time for V2X intra-band con-current operation with different carriers in TDD bands. Qualcomm Incorporated
8. R4-2117649 Timing reference for NR SL on SL enhancements Qualcomm Incorporated
9. R4-2117831 MPR for NR V2X intra-band con-current operation with Uu LG Electronics
10. R4-2118081 TR38.785 v0.4.0 TR Update for SL enhancement in Rel-17 LG Electronics France
11. R4-2118083 RF requirements for intra-band con-current V2X operation with NR PC5 and NR Uu in a licensed band LG Electronics France
12. R4-2118279 Further discussion on intra-band con-current operation issues vivo
13. R4-2118707 TP and Discussion on MPR requirements for intra-band con-current V2X operation Huawei, HiSilicon
14. R4-2118988 CR on Pcmax for NR V2X Ericsson
15. R4-2119245 draft CR for TS 38.101-1 correctiron on intra-band concurrent operation Xiaomi
16. R4-2119246 further discussion on configured power for concurrent operation Xiaomi
17. R4-2119247 further discussion on PEMAX issue Xiaomi
18. R4-2119250 on synchronous operation between SL and Uu Xiaomi
19. R4-2119251 on time mask for TDM intra-band concurrent operation Xiaomi
20. R4-2119534 On Pcmax for intra-band concurrent operation Huawei, HiSilicon
21. R4-2119536 draft CR for TS 38.101-3 correction of output power for intra-band V2X operation (R16) Huawei, HiSilicon
22. R4-2119537 draft CR for TS 38.101-3 correction of output power for intra-band V2X operation (R17) Huawei, HiSilicon
23. R4-2119925 Email discussion summary for [101-e][125] NRSL\_enh\_Part\_1 Moderator (LGE)
24. R4-2119926 Email discussion summary for [101-e][126] NRSL\_enh\_Part\_2 Moderator (CATT)
25. R4-2119981 WF on Pcamx revision in NR V2X UE in Rel-16 Xiaomi
26. R4-2119982 WF on REFSENS requiremetns in SL enh. UE in n14 LGE
27. R4-2119983 CR for TS 38.101-3, Correction on configured transmitted power for inter-band V2X concurrent operation (Rel-16) CATT
28. R4-2119984 CR for TS 38.101-1, Correction on configured transmitted power for inter-band V2X concurrent operation (Rel-16) CATT
29. R4-2119985 TP on Updating REFSENS requirements for NR SL enhancement LG Electronics France
30. R4-2119986 TP for SL enhancements vivo
31. R4-2119988 WF on RF requirements and sync issues for intra-band operation CATT
32. R4-2119989 WF on MPR for intra-band V2X con-current operation Huawei, HiSilicon, LGE
33. R4-2119990 TP on RF requirements for intra-band con-current V2X operation in licensed band LG Electronics France
34. R4-2120047 LS on PEMAX for NR-V2X Huawei, CATT
35. R4-2120048 draft CR for TS 38.101-1 Configured transmitted power for NR V2X intra-band con-current operation Huawei, HiSilicon
36. R4-2118280 Further discussion on HPUE signalling issues in Rel-17 SL enhancements vivo
37. R4-2118281 Discussion on con-current band combinations for SL HPUE vivo
38. R4-2118987 Co-channel existing Ericsson
39. R4-2118989 HPUE power classs for sidelink PC5 Ericsson
40. R4-2118990 Pemax definition for SL Enhancement UE Ericsson
41. R4-2119248 further discussion on V2X HPUE power class signaling Xiaomi
42. R4-2119532 On specific HPUE power class capability for NR V2X Huawei, HiSilicon
43. R4-2119927 Email discussion summary for [101-e][127] NRSL\_enh\_Part\_3 Moderator (Huawei)
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45. R4-2119992 LS on Signalling of PC2 V2X intra-band concurrent operation Xiaomi
46. R4-2117371 Further discussion on RRM requirements for intra-band con-current V2X operation CATT
47. R4-2117372 Further discussion on RRM requirements related to SL-DRX CATT
48. R4-2117625 On NR SL RRM Requirement Qualcomm, Inc.
49. R4-2117762 Further discussion on Intra-band con-current V2X operation RRM requirements vivo
50. R4-2117763 Further discussion on SL-DRX RRM requirements vivo
51. R4-2117813 Discussion on RRM requirements for NR sidelink enhancement Xiaomi
52. R4-2117814 Discussion on RRM requirements for NR sidelink enhancement Xiaomi
53. R4-2117832 RRM requirements for intra-band con-current SL operation LG Electronics
54. R4-2117833 RRM requirements for SL-DRX LG Electronics
55. R4-2118391 Discussion on SL-DRX OPPO
56. R4-2118836 Discussion on RRM impacts related to intra-band con-current V2X operation Huawei, Hisilicon
57. R4-2118837 Discussion on RRM impacts related to SL DRX Huawei, Hisilicon
58. R4-2118927 Discussions on DRX in NR SL enhancement ZTE Corporation
59. R4-2118928 RRM requirements for FDM based intra-band con-current SL operation ZTE Corporation
60. R4-2119068 Discussions on RRM impact due to Rel-17 SL operation Ericsson
61. R4-2119069 Discussions on SL DRX for Rel-17 SL operation Ericsson
62. R4-2120315 WF on NR SL enhancements RRM requirements LG Electronic
63. R4-2120369 Email discussion summary for [101-e][227] NR\_SL\_enh\_RRM Moderator (LGE)