**3GPP TSG RAN meeting #91e RP-21xxxx**

**Electronic Meeting, March 16-26, 2021**

## Status Report to TSG

**Agenda item:** 9.7.3

|  |  |
| --- | --- |
| **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: 30% | Performance Part: xx% | Testing part: xx% |

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 |
| **Company** | LG Electronics |
| **Email** | edison.lee@lge.com |

## 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#104-e**

Regarding resource allocation for power saving, the following agreements and conclusions were made:

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

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

* + - Preserve is a periodicity value from the configured set of possible resource reservation periods allowed in the resource pool (*sl-ResourceReservePeriodList*). Down select to one:
			* Option 1: Preserve corresponds to all values from the configured set *sl-ResourceReservePeriodList*
			* Option 2: $ P\_{reserve}$ Preserve corresponds to a subset of values from the configured set *sl-ResourceReservePeriodList*
				+ FFS how to determine the subset (e.g., by (pre-)configuration, UE determination)
			* Option 3: $P\_{reserve}$ Preserve is a common divisor among values in the configured set *sl-ResourceReservePeriodList*
			* Option 4: FFS others
		- k is selected according to (down select to one)
			* Option 1: Only the most recent sensing occasion for a given reservation periodicity before the resource (re)selection trigger or the set of Y candidate slots subject to processing time restriction
			* Option 2: The two most recent sensing occasions for a given reservation periodicity before the resource (re)selection trigger or the set of Y candidate slots subject to processing time restriction
			* Option 3: All possible sensing occasions after $n –T\_{0}$
			* Option 4: Only one periodic sensing occasion for one reservation period. The k value is up to UE implementation. Max value for k is (pre-)configured.
			* Option 5: k is (pre-)configured, including multiple values
			* Option 6: (pre-)configuration of a bitmap, same as in LTE-V
			* Option 7: FFS others
		- FFS relationship between periodic sensing occasions and SL-DRX
		- FFS condition(s) and timing(s) for which periodic-based partial sensing is performed by UE
		- Note: companies are encouraged to show performance data for the down selections
* Agreements on contiguous partial sensing operation
	+ In a resource pool (pre-)configured with at least partial sensing, if UE performs contiguous partial sensing and resource (re-)selection is triggered in slot n, support the following option:
		- Option 1: For the purpose of resource (re-)selection, the UE monitors slots between [n+TA, n+TB] and performs identification of candidate resources, in or after slot n+TB, based on all available sensing results, including periodic-based partial sensing results (if applicable).
			* FFS TA, TB (including the possibility of equal to zero, positive or negative) and remaining details (in particular, whether there should be exclusion of slots, changes in TA/TB values for different purposes, etc.)
			* FFS whether n can be replaced by e.g., index of some of Y candidate slots
		- FFS condition(s) in which contiguous partial sensing is performed by UE
		- FFS interaction with SL-DRX, if any
		- FFS interaction with periodic-based partial sensing, if any
		- Other options are not precluded
		- Note: This option is not to replace random resource selection only without sensing or re-evaluation and pre-emption checking

Regarding inter-UE coordination in mode 2 enhancements, the following conclusions were made:

* Conclusions on feasibility/benefit of inter-UE coordination
	+ RAN1 concludes that the inter-UE coordination in Mode 2 is feasible, and is beneficial (e.g., reliability, etc.) compared to Rel-16 Mode 2 RA, and thus recommends specification of the feature.
		- The detailed observations can be found in the attachment of the LS
	+ Draft LS in [R1-2102165](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2102165.zip), along with the attachment [R1-2102166](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_104%5CDocs%5CR1-2102166.zip), is approved (with a typo fix). Final LS in R1-2102168.

Regarding sidelink evaluation methodology update for power saving, the following agreements were made:

* Agreements on layout options for commercial use case
	+ For commercial use case, following layout options are supported:
		- Option 3 of TR 36.843: Urban macro (500m ISD) (all UEs outdoor)
			* UE dropping as in Table A.2.1.1-1
				+ All UEs are outdoors UEs
		- Option 1: Urban macro (500m ISD) + 1 RRH/Indoor Hotzone per cell for optional
			* UE dropping as in Table A.2.1.1-1
				+ Mix of outdoor and indoor UEs
		- Option 5 of TR 36.843: Urban macro (1732m ISD) for optional
			* UE dropping as in Table A.2.1.1-1
				+ All UEs are outdoors UEs
				+ Mix of outdoor and indoor UEs
* Agreements on traffic models for public safety case
	+ For public safety use case, following options are supported for traffic model:
		- Option 2: VoIP model specified in TR 36.843
		- Option 4: FTP model 3 in TR 38.840 with packet size of 0.5Mbytes and mean inter-arrival time of 200ms
		- Option 7: Periodic traffic model 3 specified in TR 37.885
		- Option 9: VoIP model specified in TR36.843 with change of the value of outage definition into 0.01 and with packet delay budget of 75 ms
	+ Companies are encouraged to provide results for more than one traffic model including option 7
* Agreements on evaluation scenarios for V2P
	+ For V2P evaluation, the mixture of at least V2P traffic and V2V traffic is supported.
		- Each Tx V-UE performs either only V2V traffic or only V2P traffic.
		- NOTE: Companies are encouraged to report the ratio between V-UEs performing V2V traffic and V-UEs performing V2P traffic.

#### 2.1.2 Remaining Open issues

The followings are the remaining open issues:

* Physical layer aspects on resource allocation to reduce UE’s power consumption including;
	+ Details of partial sensing based resource selection and random resource selection
	+ Details and condition(s) in which re-evaluation and pre-emption can be performed by UEs performing sensing
	+ Whether/how to support congestion control for power saving resource allocation schemes
	+ Impacts of sidelink DRX on physical layer, if any
* Physical layer aspects on solution(s) on the enhancement(s) in mode 2 for enhanced reliability and reduced latency

## 2.2 RAN2

#### 2.2.1 Agreements

**RAN2#113-e**

Regarding sidelink DRX, the following agreements were made:

* Agreements on SA2’s questions
	+ For Q1, RAN2 reply AS layer can determine DRX parameters and no additional input from V2X layer other than the currently available QoS is needed.
	+ RAN2 confirms that for unicast, the PC5 DRX may be negotiated between the UEs in AS layer. We can also include this RAN2 confirmation into the response LS.
	+ For Q2, RAN2 further reply that for SL unicast, other than DRX parameter negotiation/sharing reason, AS layer can provide the PC5 DRX related information to the V2X layer, and RAN2 is working on the detailed DRX parameter that applies to each cast type. RAN2 would keep SA2 being update on the RAN2 progress.
	+ For Q3, RAN2 reply that RAN2 does not think it is beneficial for broadcast and groupcast to share the PC5 DRX related information amongst UEs in the vicinity in V2X layer.
	+ For Q4, RAN2 reply that RAN2 is working on this aspects following the WID bullet of “Specify mechanism aiming to align sidelink DRX wake-up time with Uu DRX wake-up time in an in-coverage UE”, RAN2 would keep SA2 updated on related working progress.
* Agreements on high-level principles for SL DRX
	+ For SL unicast (after SL unicast link is established), SL DRX configuration can be configured per a pair of source/destination. FFS whether SL DRX operates per direction or for both directions.
	+ For SL groupcast/broadcast, SL DRX configuration can be configured in common. FFS on granularity of SL DRX configuration.
	+ Short DRX cycle is not introduced for SL unicast, groupcast and broadcast in Rel-17.
	+ For data reception, RAN2 defines the behaviour for monitoring the SCI reception (i.e., PSCCH and 2nd SCI on PSSCH) during the SL active time for SL DRX. For data reception, the UE may skip monitoring of PSCCH and 2nd SCI on PSSCH during inactive time for SL DRX. Sensing aspect is not considered in this agreement.
	+ At least, On-duration timer and Inactivity timer are supported in SL unicast.
	+ HARQ RTT is supported in SL unicast. FFS for the detailed condition when it is supported. FFS whether HARQ RTT is explicitly configured or can be based on SCI. FFS on the need of HARQ retransmission timer.
	+ At least, on-duration timer is supported for SL groupcast. FFS for the need and detailed condition when inactivity timer is supported.
	+ HARQ RTT is supported in SL groupcast. FFS for the detailed condition when it is supported. FFS whether HARQ RTT is explicitly configured or can be based on SCI. FFS on the need of HARQ retransmission timer.
	+ At least, on-duration timer is supported for SL broadcast.
	+ SL DRX Command MAC CE is introduced for SL DRX operation in unicast. FFS on the need of groupcast. FFS on the detailed UE behaviour (including relation to inactivity timer).
	+ In mode 1, when in RRC\_CONNECTED, if DRX is configured, the MAC entity monitors the PDCCH for the MAC entity's SL-RNTI, SLCS-RNTI and SL Semi-Persistent Scheduling V-RNTI in Uu DRX Active Time. MAC entity does not need to monitor the PDCCH for the MAC entity's SL-RNTI, SLCS-RNTI and SL Semi-Persistent Scheduling V-RNTI in Uu DRX in-active Time.
* Agreements on SL DRX configurations
	+ For broadcast/groupcast, for out-of-coverage case, TX-UE/RX-UE obtain DRX configuration from pre-configuration.
	+ For broadcast/groupcast, for in-coverage case, RRC\_IDLE/INACTIVE TX-UE/RX-UE obtain DRX configuration from SIB. It is up to network implementation how to coordinate active time between different cells.
	+ For broadcast/groupcast, for in-coverage case, for RRC\_CONNECTED TX-UE/RX-UE can obtain DRX configuration from SIB. FFS on whether dedicated-RRC is also used.
	+ For unicast, for OOC scenario, the UE who sends out the DRX configuration decides on the DRX configuration. FFS on whether pre-configuration and/or the assistance information from the peer UE is also taken into account when determining the DRX configuration.
	+ For unicast, for OOC scenario, adopt per-direction DRX configuration is as baseline. FFS on whether it is TX-centric or Rx-centric, i.e. TX UE or RX UE decides it.
* Agreements on granularity of SL DRX operation for groupcast/broadcast
	+ RAN2 kindly agree that for groupcast and broadcast communication further granularity to multiple sets of DRX configurations (beyond just cast type) is required i.e. more than two DRX Cycle configurations should be supported in specification.
	+ RAN2 will study/discuss how PQI and/or L2 destination ID is used to derive groupcast and broadcast DRX configuration.
	+ Timer-based SL DRX is also applied to SL groupcast/broadcast.

#### 2.2.2 Remaining Open issues

The followings are the remaining open issues:

* Protocol layer aspects on resource allocation to reduce UE’s power consumption
* Protocol layer aspects on sidelink DRX for broadcast, groupcast, and unicast including;
	+ Details of timer for unicast, and whether/how to support timer for broadcast/groupcast
	+ 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
* Protocol layer aspects on solution(s) on the 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#98-e**

RAN4 agreed 9 WFs and Draft TR skeleton for SL enhancements in Rel-17 as follows:

* New SL enhancement RF requirements:
	+ RAN4 agreed with 2 WFs and TR skeleton as follows:
		- Way forward on coexistence evaluation for NR SL enhancement in Rel-17 (R4-2103241)
			* Issue 1-3-1: FDD band coexistence evaluation in FR1
			* Agreements
				+ RAN4 can consider the coexistence evaluation in FDD band based on operator proposal in FDD band in Rel-17.
				+ The new FR1 SL enh. operating bands should be requested until May 2021 to evaluate the FDD coexistence evaluation in Rel-17, otherwise, RAN4 can close discussion on new FDD band in Rel-17.
			* Issue 1-3-2: Whether study for coexistence evaluation in n14 or not
			* Agreements
				+ Based on interesting operator’s operating scenarios [3], there is no Uu service for the whole band in out-of-coverage scenario. Hence, RAN4 conclude that the co-existence evaluation in n14 for out-of-coverage scenario is not needed.
			* Other Issues: New SL operating band request in FR2
			* Agreements
				+ RAN4 do not need to update the work plan to add FR2 SL enh. operation. Also RAN4 close FR2 discussion in NR SL enhancement.
		- Way forward on system parameters and operating CBW in n14 for NR SL enhancement (R4-2103242)
			* Issue 1-1-1: System parameters on CBW
			* Agreements
				+ Option 1: Follow same principle to decide the supported CBW in public safety and other SL operation. (See the principle in slide 2)
			* Issue 1-2-2: CBW for SL operation
			* Options
				+ Option 1: Only allow 10MHz CBW in n14.
				+ Option 2: Both 5MHz and 10MHz CBW in n14.
			* Agreements
				+ Based on the candidate options, RAN4 further discuss on the supported CBW in n14.
			* Issue 1-3-2: System parameters on Channel raster
			* Options
				+ Option 1: 7.5 kHz shift will be considered in NR SL refarming bands (e.g. n14) to use LTE Uu/ProSe and NR SL operation in a spectrum sharing manner. If only NR SL operation is allowed, then NR Uu channel raster will be considered.
				+ Option 2: Regardless of sharing LTE prose/SL and NR SL, RAN4 firstly need to decide which channel raster will be considered for SL enh. operation
			* Agreements
				+ Based on the candidate options (can be multiple choice), RAN4 further discuss the general principle for channel raster.
		- Agreed the draft TR Skeleton (R4-2103243)
			* RAN4 agreed the TR skeleton for SL enh. In Rel-17.
			* RAN4 can capture the new RF requirements for SL enhancements for public safety and other SL operation.
			* Also, leftover issues will be captured in this TR.
* Left over issue:
	+ Supporting PC2 NR SL UE RF requirements
		- RAN4 agreed with 3 WFs as follows:
			* Way forward on issues related to PC2 NR V2X (R4-2103249)
				+ Issue 1-1: Feasibility of HPUE for V2X operating bands n47 and n38
				+ Agreement

At least it is feasible for n47 to support HPUE.

For n38, it could have different deployment scenarios, i.e. the whole band is used for SL or co-exist with Uu service. Regulatory and co-existence study should be performed for licensed bands.

* + - * + Issue 1-2: Necessity of co-existence study for band n38
				+ Agreement

Co-existence study including regulatory study (if needed) as well as co-ex simulation is needed for n38.

* + - * + Issue 1-3: SAR issue for PC2 NR V2X
				+ Agreement

No need to consider SAR issue for PC2 NR V2X in n47 and n38.

Further check the SAR regulatory requirements in the V2X operating licensed bands if needed.

* + - * + Issue 1-4: TxD for NR V2X
				+ Agreement

It is agreed to introduce V2X TxD requirements after the NR Uu TxD requirements are defined, and it will be captured in TS 38.101-1 from Rel-16.

* + - * + Issue 1-5: Clarification on reporting the power class for UE with PC2 under SL MIMO
				+ Options

Whether to introduce PC2 UE capability will be further discussed together with issue 1-7.

* + - * + Issue 1-6: PC2 for inter-band con-current operation
				+ Agreement

It is agreed to introduce PC2 for inter-band con-current operation in Rel-17.

* + - * + Issue 1-7: Signalling for PC2 V2X
				+ Options

Option 1: To define IE for PC2 V2X UE for V2X sidelink transmission in a band and wait for main forum to settle down the new capability signaling discussion. (Xiaomi R4-2101874)

Option 2: Others

* + - * Way forward on simulation assumptions for PC2 NR V2X (R4-2103250)
				+ General simulation assumptions

|  |  |
| --- | --- |
| **parameter** | **Assumption** |
| **center frequency** | 5.9GHz |
| **Bandwidth** | 10/20/30/40MHz |
| **Maximum output power** | 26dBm |
| **numerology** | 15 kHz/30kHz/60kHz |
| **Modulation** | QPSK/16QAM/64QAM/256QAM |
| **Waveform** | CP-OFDM |
| **Carrier leakage** | 25dBc |
| **IQ image** | 25dBc |
| **CIM3** | 45dBc or 60dBc |
| **PA calibration** | PA calibrated to deliver [31dBc] ACLR for a fully allocated RBs in 20MHz QPSK DFT- S-OFDM waveform at 1 dB MPR.This is based to share PA between LTE V2X and NR V2X at 5.9GHz as worst case. |

* + - * + Assumption for PSCCH/PSSCH

 

* + - * + Assumption for PSFCH

|  |  |
| --- | --- |
| **Items** | **Assumption** |
| **Modulation for PSSCH** | QPSK |
| **PSFCH** | ZC sequence |
| **Structure of Slot** | Baseline is follow RAN1 agreements |
| **RB allocation** | * 1 RB per user
* All users have the same power per RB
* Total power of all users equals 26dBm for PC2
* Both Non-contiguous PSFCH RB allocation and contiguous PSFCH allocation are allowed
	+ MPR will be derived by non-contiguous PSFCH RB allocation (N>1)
* At least, the worst cases with possible RBstart and Ngap need to be checked. ( Ngap = RBend – RBstart )
	+ For example: The worst case N gap is (106-1 =105\*15kHz\*12=) 18.9MHz for 20MHz, 15kHz SCS
* IMD problem by dual PSFCH in SEM/SE region shall be considered to derive MPR level according to all supporting CBW and SCS.
* N (Number of users) is up to 5 and RBs except for RBstart and RBend can be inserted between RBstart and RBend randomly.
* Assumption of N in RAN4 is only for MPR simulation purpose, the final number is up to RAN1 decision.
 |

* + - * + Assumption for S-SSB

 

* + - * Way forward on co-existence simulation assumptions for PC2 NR V2X (R4-2103251)
				+ PC2 UE coexistence scenarios

|  |  |
| --- | --- |
| **NR V2X operating frequency** | **Deployment scenarios****(Aggressor-to-Victim)** |
| FR1 | Scenario A: V2X service at licensed band where only NR SL is supported. (TDD: 2.6GHz)(2nd priority) | * Case1: PC2 NR V2X UE-to- PC2 NR V2X UE
* Case2: PC2 NR V2X UE-to- PC3 NR V2X UE
 |
| Scenario B: V2X service at licensed bands where NR SL and NR Uu are supported. (TDD: 2.6GHz)(1st priority) | * Case3: PC2 NR V2X UE-to-NR Uu BS
* Case4: NR Uu UE-to- PC2 NR V2X UE
 |

* + - * + Layout model

For Scenario A, the layout model specified for ITS band in TR 38.886 clause 5.2.1.1 can be reused.

For Scenario B, the layout model specified for FR1 TDD band in TR 38.886 clause 5.2.3.1 can be reused.

* + - * + Simulation parameters for scenario A

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| NR V2X UE (Aggressor) | NR V2X UE (Victim) |
| Tx power | 26dBm | 23dBm or 26dBm |
| Channel Bandwidth | 20MHz | 20MHz |
| Packet size | 1) 14 PRB (190 byte packet) for 15kHz SCS 2) Other options are not precluded | 1) 14 PRB (190 byte packet) for 15kHz SCS 2)Other options are not precluded |
| Traffic model | 1 transmission every 100ms* 100ms message generation period
* Time instance of message generation is randomized among vehicles
 |
| Noise figure | 9dB | 9dB |
| Antenna pattern | Omni-directional with gain of 0 dBi |
| Sidelink Power control | The worst case of no power control is used |
| SINR-to-BLER mapping | As per link level performance model in TR 38.xxx Table A-x for 2.6GHz | As per link level performance model in TR 38.xxxTable A-x for 2.6GHz |

* + - * + Simulation parameters for Scenario B

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| NR UE | NR BS | NR V2X UE  |
| Max Tx power | 23dBm or 26dBm | NA | 26dBm |
| Channel Bandwidth | 20MHz | 20MHz | 20MHz |
| Packet size | 1) [32] PRB for 15kHz SCS 2)Other options are not precluded |   | 1) 14 PRB (190 byte packet) for 15kHz SCS 2)Other options are not precluded |
| Traffic model | Full buffer | Full buffer | Reference table 5.2.1.2-1 |
| Noise figure | N/A | 5dB | 9dB |
| Antenna pattern | Omni-directional with gain of 0 dBi | Antenna pattern for FR1 Macro BS from TR 38.828 | Omni-directional with gain of 0 dBi |
| SINR-to-BLER mapping for NR V2X | NA | NA | As per link level performance model in TR 38.xxxTable A-x for 2.6GHz |
| SINR-to-rate mapping for NR | NA | As per link level performance model in TR 36.942 (Table A.2). α, attenuation = 0.4, SNIRMIN, dB = -10, SNIRMAX, dB = 22 (subclause 5.2.3.6 from TR 38.828). | NA |

* + - * + Power control

For Scenario A, OLPC in TR36.786 can be reused or no power control is used.

For scenario B, the power control specified for FR1 TDD band in TR 38.886 clause 5.2.3.4 can be reused.

* + Partial used SL operation in a carrier including n79 and other interesting bands
		- RAN4 agreed with 4 WFs as follows:
			* Way forward on TDM operation for SL and Uu in licensed band (R4-2103244)
				+ Whether to introduce TDM operation between SL and Uu
				+ Options

Option 1: RAN4 allow TDM operation between spectrally partially used PC5 SL and Uu UL/DL operation in a licensed TDD band (different carriers).

Option 2: RAN4 allow TDM operation without FDM for SL and Uu in a licensed TDD band (same carrier).

* + - * + Agreements

Both Option 1 and option 2 are feasible in TDD licensed band, e.g. n79.

* + - * + Time mask for SL and Uu switching
				+ Options

Option 1: Consider the TDM timing mask for partially used SL operation with NR Uu in paper R4-2102346.

Option 2: Postpone until the operation mode and coexistence scenario are clear. TDM timing mask for partially used SL operation to be specified, FFS on TDM timing mask detail.

* + - * + Agreements

Option 2 can be agreed

* + - * + UE RF architecture for TDM
				+ Options

Option 1: One single RF chain can be used for TDM operation between SL and Uu in TDD licensed band.

Option 2: A single RF chain or other architectures can be used for TDM operation between SL and Uu in TDD licensed band.

* + - * + Agreements

Single RF chain is considered as baseline for TDM (without additional FDM). Other RF architecture is not precluded.

* + - * Way forward on FDM operation for SL and Uu in licensed band (R4-2103245)
				+ FDM operation with shared or different carriers
				+ Options

Option 1: RAN should allow FDM operation with one shared carrier for SL and Uu in licensed band

Option 2: RAN should allow FDM operation with different carriers for SL and Uu in licensed band.

* + - * + Agreements

Both option 1 and option 2 in TDD band can be considered

Both option 1 and option 2 in FDD band can be considered

* + - * + Frequency Separation in adjacent channel
				+ Options

Option 1: RAN4 study frequency separation in case of FDM operation between SL and Uu

Option 1a:RAN4 study frequency separation in FDM operation between SL and Uu to allow simultaneous UL Tx and SL Rx.

Option 2: No frequency separation needs to be studied.

Option 2a: RAN4 can allow FDM operation in TDD licensed band with restriction of SL Tx/Rx only allowed in UL configuration when NR Uu has not transmitted signalling.

* + - * + Agreements

Further discuss whether frequency separation study is needed

* + - * + Frequency Separation in non-adjacent channel
				+ Options

Option 1: RAN4 study frequency separation in case of FDM operation between SL and Uu

Option 1a:RAN4 study frequency separation in FDM operation between SL and Uu to allow simultaneous UL Tx and SL Rx.

Option 2: No frequency separation needs to be studied.

Option 2a: RAN4 can allow FDM operation in TDD licensed band with restriction of SL Tx/Rx only allowed in UL configuration when NR Uu has not transmitted signalling.

* + - * + Agreements

Further discuss whether frequency separation study is needed

* + - * + RF Architecture
				+ Options

Option 1: Separate RF architecture

Option 2: Up to UE implementation

* + - * + Agreements

Further discuss the RF architecture in the next RAN4 meeting.

* + - * + Whether the RF architecture and core requirements of 2UL intra-band CA could apply to V2X intra-band con-current operation in band n79
				+ Options

Option 1: YES

Option 2: NO

* + - * + Agreements

Option 2. Both the RF architecture and core requirements need further study independently from intra-band CA.

* + - * Way forward on MPR/A-MPR simulation assumption for intra-band V2X con-current operationV2X (R4-2103246)
				+ General agreements for V2X con-current operation in a licensed band

To derive MPR/A-MPR requirements for NR V2X intra-band con-current operation in a licensed band, both shared and separate RF architectures will be considered

But some operations (e.g individual power control or different waveforms) will be restricted.

The basic simulation assumptions for intra-band con-current operation in a licensed band can reuse the simulation assumptions in TR38.886 in Rel-16.

The example operating NR V2X band is n79.

Firstly, RAN4 can specify the intra-band contiguous con-current operation with adjacent channel.

In here, do not allow simultaneous NR UL Transmission and NR SL reception within adjacent channel.

Target is CA bandwidth class B (2CCs, 20 MHz ≤ aggregated BW ≤ 100 MHz) for NR V2X intra-band contiguous con-current operation.

For the intra-band non-contiguous con-current operation, RAN4 need further discussion to allow FDM operation and study the frequency gap between NR SL CC and NR Uu CC.

* + - * + RB allocation and waveform

Define each PSSCH/PSCCH transmission, simultaneous multiple PSFCH transmission and S-SSB transmission for PC3 NR V2X intra-band con-current operation

Inner/outer contiguous/non-contiguous RB allocations definition for PC3 is used to evaluate MPR

Focus on only CP-OFDM waveform in NR SL UE is used.

For NR UE, both CP-OFDM and DFT-S-OFDM waveforms are considered.

To derive A-MPR requirements, RAN4 need to study the regulatory requirements in n79 and other NR V2X operating band, then RAN4 can further discuss the A-MPR requirements to comply the regional regulation requirements.

Channel BW configurations for class B should be evaluated

Class B: RAN4 evaluate following CBW combinations

At least 10MHz (NR SL, 30kHz SCS)+10MHz (NR Uu, 30kHz SCS)

10MHz (NR SL, 30kHz SCS) +20/40/60/80MHz (NR Uu, 30kHz SCS)

20MHz (NR SL, 30kHz SCS) + 20/40/80MHz (NR Uu, 30kHz SCS)

Other CBW combinations are not precluded

MPR/A-MPR simulation assumptions for intra-band con-current V2X operation

|  |  |
| --- | --- |
| **parameter** | **Assumption** |
| **center frequency** | 4.5GHz (n79) |
| **Each Bandwidth** | 10/20/30/40MHz for NR SL10/20/40/60/80MHz for NR Uu |
| **Maximum total output power** | 23dBm |
| **numerology** | 15KHz, 30kHz and 60kHz |
| **Modulation** | QPSK/16QAM/64QAM/256QAM |
| **Waveform** | CP-OFDM for NR SLCP-OFDM or DFT-S-OFDM for NR Uu |
| **Carrier leakage** | 25dBc |
| **IQ image** | 25dBc |
| **CIM3** | 45~60dBc |
| **PA calibration** | PA calibrated per CC to deliver -30dBc ACLR for a fully allocated RBs in 20MHz QPSK DFT-S-OFDM waveform at 1dB MPR. |

|  |  |
| --- | --- |
| **Items** | **Assumption** |
| **Allowed sub-channel sizes for NR SL** | * Support {10, 12, 15, 20, 25, 50, 75, 100} PRBs for NR SL.
* No restriction of size of RB for NR Uu.
 |
| **Allowed LCRB allocation for NR SL** | 10,12,15,20, 24, 25,30,36, 40,45,48,50,60,70,72, 75,80,84, 90,96,100,105,108,110,120,130,132,135,140,144,150,156,160,165,168,170,175,180,190,192,195,200,204,210, 216.No restriction of LCRB for NR Uu. |
| **Regarding PSCCH / PSSCH multiplexing for NR SL** |  |
| **PSCCH size for NR SL** | 10RB\*3 Symbols |
| **PSD offset of X dB between PSCCH and PSSCH for NR SL** | 0dB  |

* + - * Way forward on synchronous operation between Uu and SL in licensed band (R4-2103247)
				+ Issue 2-1-1: Transmission timing between SL and Uu
				+ Agreement

Whether to introduce the SL Transmission to be aligned with UL timing of Uu in licensed carrier operation will be decided in next RAN4 meeting. The company are encouraged to bring contributions on system benefit of introducing the SL transmission aligned with either UL or DL timing in Rel-17.

No need to send LS to RAN1 in this meeting.

* + - * + Issue 2-1-2: SL guard period
				+ Options

Option 1: To avoid the interference to the network UL receiving, the SL guard period should be greater than (2\*Tp+ Transient time). If Uu transmission should happen after SL transmission at time slot immediately after SL transmission, to avoid the disturbance to its own SL transmission, the SL guard period should be greater than (3\*Tp+ 2\*Transient time + N\_TA\_offset).

Option 2: Even though there is a Tx time difference between PC5 and Uu, RAN4 expect there would be no self-interference problem in its own device.

Option 3: Postpone until transmission timing between SL and Uu is decided.

Option 4: Discuss together with issue 2-1-1 to decide the transmission timing.

Option 4a: Postpone to next meeting and discuss together with issue 2-1-1

* + - * + Agreement

Option 4a

* + - * + Issue 2-2-1: Synchronization reference source for SL
				+ Agreements

Companies are encouraged to bring the understanding on current RAN1/RAN2 specification to support statements below next meeting:

Network should be always configured as synchronization reference source for in-coverage scenario.

Network should be always highest priority to be used when it is configured as one synch source for SL UE.

RAN4 decide next meeting on synchronization source on synchronous operation between Uu and SL in licensed band.

#### 2.4.2 Remaining Open issues

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
* Define PC2 UE RF requirements in unlicensed band
* Based on PC2 coexistence evaluation in licensed band, RAN4 can specify PC2 UE RF requirements in licensed band
* Partial usage between NR SL operation and NR Uu operation in licensed band can specify related RF core requirements to support intra-band contiguous/non-contiguous con-current V2X operation in licensed band.

## 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 FS\_eV2XARC\_Ph2 status – general

SA2 has completed FS\_eV2XARC\_Ph2 (Study on architecture enhancements for 3GPP support of advanced V2X services – Phase 2) with TR 23.776 to investigate 5G System enhancements based on what has been specified in Rel-16, for enhanced support of V2X operation for pedestrian UEs (i.e. UEs for Vulnerable Road Users), e.g. V2X communication with power efficiency, according to vehicular services requirements defined in TS 22.185 and TS 22.186.

TR 23.776 is sent to SA#91e for approval.

To progress normative work on PC5 DRX operation as per conclusions reached within TR 23.776 (clause 7.2), new WID on Architecture enhancements for 3GPP support of advanced V2X services – Phase 2 (eV2XARC\_Ph2) was approved in SA2#143E (24 February – 09 March, 2021) - S2-2101127.

#### 3.1.1 Agreements with cross-TSG impacts

Regarding FS\_eV2XARC\_Ph2, NR PC5 DRX operations were concluded based on the feedbacks from RAN2 (S2-2100141/R2-2102182: Reply LS from RAN2 on PC5 DRX operation) in clause 7.2 of TR 23.776.

Regarding the RAN2 LS on geo-area confinement (S2-2100040/R2-2010960), SA2 sent the reply LS to RAN2 (S2-2101319) in SA2#143E (24 February – 09 March, 2021) with the following feedback:

* SA2 has same understanding on the RAN2 agreement, that is, the Objective 5 in Rel-17 SL enhancement WI can be supported by Rel-16 TS 23.287. No change in TS 23.287 is needed related to the Objective 5.

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

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

No open issue was identified for FS\_eV2XARC\_Ph2.

## 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.

 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#104-e**

1. R1-2100047 Views on resource allocation enhancements for sidelink communication FUTUREWEI
2. R1-2100141 Power saving mechanism in NR sidelink OPPO
3. R1-2100142 Inter-UE coordination in mode 2 of NR sidelink OPPO
4. R1-2100143 Remaining issues in sidelink evaluation methdology for power saving OPPO
5. R1-2100205 Sidelink resource allocation to reduce power consumption Huawei, HiSilicon
6. R1-2100206 Inter-UE coordination in sidelink resource allocation Huawei, HiSilicon
7. R1-2100309 Considerations on partial sensing in NR V2X CAICT
8. R1-2100351 Discussion on resource allocation for power saving CATT, GOHIGH
9. R1-2100352 Discussion on feasibility and benefits for mode 2 enhancements CATT, GOHIGH
10. R1-2100353 Remaining issues on sidelink evaluation methodology CATT, GOHIGH
11. R1-2100466 Resource allocation for sidelink power saving vivo
12. R1-2100467 Discussion on mode-2 enhancements vivo
13. R1-2100468 Other aspects on SL enhancements vivo
14. R1-2100486 Power consumption reduction for sidelink resource allocation FUTUREWEI
15. R1-2100492 Discussion on resource allocation for power saving Zhejiang Lab
16. R1-2100493 Inter-UE coordination for mode 2 Zhejiang Lab
17. R1-2100517 Discussion on resource allocation for power saving LG Electronics
18. R1-2100518 Discussion on feasibility and benefits for mode 2 enhancements LG Electronics
19. R1-2100519 Discussion on remaining aspects of sidelink evaluation methodology update for power saving LG Electronics
20. R1-2100538 Sidelink resource allocation for power saving Nokia, Nokia Shanghai Bell
21. R1-2100539 Inter-UE coordination in mode 2 sidelink resource allocation Nokia, Nokia Shanghai Bell
22. R1-2100546 Resource allocation for power saving TCL Communication Ltd.
23. R1-2100547 Feasibility and benefits for mode 2 enhancements TCL Communication Ltd.
24. R1-2100606 Discussion on Mode 2 enhancements MediaTek Inc.
25. R1-2100612 Resource allocation for sidelink power saving MediaTek Inc.
26. R1-2100672 Design of sidelink power saving solutions Intel Corporation
27. R1-2100673 On feasibility and benefits of inter-UE coordination for sidelink mode-2 design Intel Corporation
28. R1-2100687 Resource allocation mechanisms for power saving Ericsson
29. R1-2100688 Feasibility and benefits of mode 2 enhancements for inter-UE coordination Ericsson
30. R1-2100689 Remaining evaluation assumptions and methodology for power saving Ericsson
31. R1-2100696 Discussion on Sidelink Resource Allocation for Power Saving Panasonic Corporation
32. R1-2100701 NR Sidelink Resource Allocation for UE Power Saving Fraunhofer HHI, Fraunhofer IIS
33. R1-2100702 Resource Allocation Enhancements for Mode 2 Fraunhofer HHI, Fraunhofer IIS
34. R1-2100722 V2X channel model and scenario updates GDCNI
35. R1-2100745 Considerations on partial sensing and DRX in NR V2X Fujitsu
36. R1-2100746 Considerations on inter-UE coordination for mode 2 enhancements Fujitsu
37. R1-2100766 Sidelink resource allocation for Power saving Lenovo, Motorola Mobility
38. R1-2100767 Sidelink resource allocation for Reliability enhancement Lenovo, Motorola Mobility
39. R1-2100801 Discussion on sidelink resource allocation for power saving Spreadtrum Communications
40. R1-2100802 Discussion on feasibility and benefit of mode 2 enhancements Spreadtrum Communications
41. R1-2100828 Inter-UE coordination for enhanced resource allocation Mitsubishi Electric RCE
42. R1-2100870 Discussion on sidelink resource allocation for power saving Sony
43. R1-2100871 Discussion on reliability and latency enhancements for mode 2 Sony
44. R1-2100924 Discussion on sidelink power saving ZTE, Sanechips
45. R1-2100925 Discussion on inter-UE coordination ZTE, Sanechips
46. R1-2100926 Discussion on remaining issues for sidelink evaluation methodology ZTE, Sanechips
47. R1-2100946 Discussion on resource allocation for power saving NEC
48. R1-2100947 Discussion on feasibility and benefits for mode 2 enhancements NEC
49. R1-2100962 Discussion on resource allocation for power saving Hyundai Motors
50. R1-2100963 Discussion on feasibility and benefits for mode 2 enhancements Hyundai Motors
51. R1-2100981 Resource allocation for power saving InterDigital, Inc.
52. R1-2100982 On inter-UE coordination for Mode 2 enhancement InterDigital, Inc.
53. R1-2100983 On SL multi-carrier operation and remaining issues for simulation methodology update InterDigital, Inc.
54. R1-2101004 Mode 2 enhancements in sidelink Panasonic Corporation
55. R1-2101060 Discussion on resource allocation for power saving CMCC
56. R1-2101061 Discussion on reliability and latency enhancements for mode-2 resource allocation CMCC
57. R1-2101086 Discussion on resource allocation for power saving ETRI
58. R1-2101087 Discussion on feasibility and benefits for mode 2 enhancements ETRI
59. R1-2101097 Discussion on sidelink resource allocation for power saving Xiaomi
60. R1-2101098 Feasibility and benefits for mode2 enhancements Xiaomi
61. R1-2101099 Discussion on remaining issues of sidelink evaluation methodology Xiaomi
62. R1-2101229 On Sidelink Enhacement Work Item Samsung
63. R1-2101230 On Resource Allocation Enhancements Samsung
64. R1-2101231 On Resource Allocation for Power Saving Samsung
65. R1-2101232 On Feasibility and Benefits for Mode2 Enhancements Samsung
66. R1-2101233 On Sidelink Issues and RAN1 Impacts Samsung
67. R1-2101254 Physical layer impacts of sidelink DRX Huawei, HiSilicon
68. R1-2101357 Sidelink Resource Allocation for Power Saving Apple
69. R1-2101358 Inter-UE Coordination for Mode 2 Resource Allocation Apple
70. R1-2101400 Discussion on Reduce Power Consumption for Sidelink ROBERT BOSCH GmbH
71. R1-2101401 Discussion on Sidelink Mode-2 Resource Allocation Enhancements ROBERT BOSCH GmbH
72. R1-2101409 Inter-UE coordination for mode 2 enhancement ITL
73. R1-2101412 FL summary for AI 8.11.1.1 – resource allocation for power saving Moderator (OPPO)
74. R1-2101422 On NR Sidelink Resource Allocation for Power Saving Convida Wireless
75. R1-2101423 On NR Sidelink Resource Allocation Mode 2 Enhancement Convida Wireless
76. R1-2101485 Power Savings for Sidelink Qualcomm Incorporated
77. R1-2101486 Reliability and Latency Enhancements for Mode 2 Qualcomm Incorporated
78. R1-2101550 Discussion on resource allocation for power saving Sharp
79. R1-2101551 Discussion on feasibility and benefits for mode 2 enhancements Sharp
80. R1-2101572 Discussion on partial sensing and SL DRX impact ASUSTeK
81. R1-2101574 Discussion on V2X mode 2 enhancements ASUSTeK
82. R1-2101630 Discussion on sidelink resource allocation for power saving NTT DOCOMO, INC.
83. R1-2101631 Resource allocation for reliability and latency enhancements NTT DOCOMO, INC.
84. R1-2101647 Feasibility and benefits for NR Sidelink mode 2 enhancements CEWiT
85. R1-2101663 Resource allocation for power saving with partial sensing in NR sidelink enhancement ITL
86. R1-2101786 Discussion on feasibility and benefits for mode 2 enhancements LG Electronics
87. R1-2101788 Considerations on partial sensing and DRX in NR V2X Fujitsu
88. R1-2101790 Resource allocation for sidelink power saving vivo
89. R1-2101791 Discussion on mode-2 enhancements vivo
90. R1-2101801 FL summary #1 on other issues in NR Sidelink enhancement Moderator (CATT)
91. R1-2101804 Feasibility and benefits of mode 2 enhancements for inter-UE coordination Ericsson
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93. R1-2101911 Discussion on mode-2 enhancements vivo
94. R1-2101926 Discussion on Mode 2 enhancements MediaTek Inc.
95. R1-2101941 Inter-UE coordination in sidelink resource allocation Huawei, HiSilicon
96. R1-2102024 Summary of [104-e-NR-R17-SL-LS-01] regarding potential reply to LS in R1-2100021 Moderator (ZTE)
97. R1-2102130 FL summary #2 on other issues in NR Sidelink enhancement Moderator (CATT)
98. R1-2102165 Draft LS on Mode 2 enhancements in NR sidelink LG Electronics
99. R1-2102166 Detailed observations from evaluation results Moderator (LG Electronics)
100. R1-2102167 Feature lead summary for AI 8.11.1.2 Feasibility and benefits for mode 2 enhancements Moderator (LG Electronics)
101. R1-2102168 LS on Mode 2 enhancements in NR sidelink RAN1, LG Electronics
102. R1-2102268 Feature lead summary for AI 8.11.1.2 Feasibility and benefits for mode 2 enhancements Moderator (LG Electronics)

**RAN2#113-e**

1. R2-2100019 Reply LS on new PQI support for PC5 communication (R1-2009621; contact: OPPO) RAN1
2. R2-2100105 Discussion on SA2 LS on sidelink DRX OPPO
3. R2-2100235 Sidelink DRX Granularity CATT
4. R2-2100236 Sidelink DRX Timer Maintainence and Active Time Definition CATT
5. R2-2100237 Sidelink DRX Configuration Procedure for Sidelink Unicast CATT
6. R2-2100238 Impacts of Sidelink DRX on the Other Procedures CATT
7. R2-2100239 Consideration on the Resource Allocation Enhancements CATT
8. R2-2100240 Mixing Blind and Feedback-based HARQ Retransmissions CATT
9. R2-2100272 Left issues on definition of SL DRX functionality OPPO
10. R2-2100273 Discussion on configuration for sidelink DRX OPPO
11. R2-2100274 Discussion on granularity for sidelink DRX OPPO
12. R2-2100275 Discussion on network involvement for SL related DRX OPPO
13. R2-2100276 Discussion on inter-UE coordination OPPO
14. R2-2100421 Reservation Chain-based DRX Power Saving Fujitsu
15. R2-2100422 Alignment of Wake-up Time between TX and RX UEs Fujitsu
16. R2-2100423 Dual-mode Configuration and Selection Mechanism for NR Sidelink Fujitsu
17. R2-2100494 Discussion on Coordination between Uu DRX and SL DRX ZTE Corporation, Sanechips
18. R2-2100495 Discussion on Mechanism to align wake-up time between TX and RX UEs ZTE Corporation, Sanechips
19. R2-2100496 Discussion on principles for sidelink DRX ZTE Corporation, Sanechips
20. R2-2100497 Discussion on timer configuration for sidelink DRX ZTE Corporation, Sanechips
21. R2-2100498 Discussion on inter-UE coordination ZTE Corporation, Sanechips
22. R2-2100499 Discussion on sensing and DRX ZTE Corporation, Sanechips
23. R2-2100514 Definition of the Active Time in SL DRX InterDigital
24. R2-2100515 Procedures for Handling the DRX Configuration InterDigital
25. R2-2100516 Performing Mode 2 Resource Allocation when configured with SL DRX InterDigital
26. R2-2100517 [DRAFT] LS on RAN1 impact on sidelink DRX InterDigital
27. R2-2100518 RAN2 Aspects of Resource Allocation with Inter-UE Coordination InterDigital
28. R2-2100519 Discussion on Uu DRX for SL UE InterDigital
29. R2-2100536 General aspects for SL DRX Ericsson
30. R2-2100537 Interaction between partial sensing and DRX Ericsson
31. R2-2100538 DRX alignment between Uu and SL Ericsson
32. R2-2100539 SL DRX alignment between two UEs Ericsson
33. R2-2100573 General Principle of NR SL DRX Fraunhofer IIS, Fraunhofer HHI
34. R2-2100574 NR SL DRX Alignment between UEs Fraunhofer IIS, Fraunhofer HHI
35. R2-2100575 NR SL DRX Uu and SL Wake-Up Time Fraunhofer IIS, Fraunhofer HHI
36. R2-2100576 Inter-UE Coordination for Sidelink Mode 2 Resource Allocation Fraunhofer IIS, Fraunhofer HHI
37. R2-2100577 Power Reduction for Sidelink Mode 2 Resource Allocation Fraunhofer IIS, Fraunhofer HHI
38. R2-2100613 Resource Allocation Enhancements for Power Saving Intel Corporation
39. R2-2100622 On general Sidelink DRX design Intel Corporation
40. R2-2100623 Alignment of Uu and SL DRX active time Intel Corporation
41. R2-2100629 Alignment of DRX active time among sidelink UEs Intel Corporation
42. R2-2100637 Discussion on SL DRX LG Electronics France
43. R2-2100638 Discussion on SL DRX Timer LG Electronics France
44. R2-2100657 Inter-UE sidelink DRX wake-up time alignment Spreadtrum Communications
45. R2-2100659 Discussion on resource allocation enhancement for NR sidelink Spreadtrum Communications
46. R2-2100690 [draft] LS to RAN1 on SL DRX timer configuration ZTE Corporation, Sanechips
47. R2-2100795 SL DRX remaining issues vivo
48. R2-2100796 Mechanism to align wake-up time between TX and RX UEs vivo
49. R2-2100797 Coordination between Uu DRX and SL DRX vivo
50. R2-2100798 Draft Reply LS on PC5 DRX operation vivo
51. R2-2100799 Uu and SL DRX impact to resource allocation mode 1 vivo
52. R2-2100800 SL DRX impact to resource allocation mode 2 vivo
53. R2-2100862 Discussion on remaining issues on SL DRX Configuration Apple
54. R2-2100863 Discussion on HARQ related timers in SL DRX Apple
55. R2-2100864 Discussion on alignment of Uu DRX and SL DRX Apple
56. R2-2100865 Discussion on resource allocation for Pedestrian UE Apple
57. R2-2100917 Discussion on Sidelink DRX and sensing Sony
58. R2-2100931 Coordination between Uu DRX and SL DRX Lenovo, Motorola Mobility
59. R2-2100981 General principles of resource allocation enhacements for SL mode 2 Ericsson
60. R2-2100982 Way forward for resource allocation enhacements for SL mode 2 Ericsson
61. R2-2101116 Discussion on sidelink resource allocation enhancements Lenovo, Motorola Mobility
62. R2-2101117 Discussion on wake-up time alignment between Tx and Rx UEs Lenovo, Motorola Mobility
63. R2-2101192 Issue with SL DRX Inactivity Timer for SL groupcast Nokia, Nokia Shanghai Bell
64. R2-2101207 SL DRX with pre-indicated resources Nokia, Nokia Shanghai Bell
65. R2-2101209 On the discrepancy TX-centric vs. RX-centric in Sidelink DRX Nokia, Nokia Shanghai Bell
66. R2-2101224 Discontinuous reception and transmission in SL Lenovo, Motorola Mobility
67. R2-2101245 Discussion on Sidelink DRX Qualcomm Finland RFFE Oy
68. R2-2101246 On Wake-up alignment between Tx and Rx UEs Qualcomm Finland RFFE Oy
69. R2-2101247 On coordination between Uu DRX and SL DRX Qualcomm Finland RFFE Oy
70. R2-2101299 Inter-UE Coordination for Enhanced Reliability Intel Corporation
71. R2-2101303 Congestion control for Resource Allocation Schemes in NR Sidelink Intel Corporation
72. R2-2101306 On configuration and operation of SL DRX Nokia, Nokia Shanghai Bell
73. R2-2101318 Coexistence of Sensing-based and Random Selection for Sidelink Mode 2 Resource Allocation Nokia, Nokia Shanghai Bell
74. R2-2101323 Backward Compatibility Issue of SL DRX with Rel.16 Sidelink Nokia, Nokia Shanghai Bell
75. R2-2101330 Granularity of SL DRX operation Samsung Research America
76. R2-2101331 Alignment of wake-up time between TX and RX UEs Samsung Research America
77. R2-2101332 Coordination between DL DRX and SL DRX Samsung Research America
78. R2-2101333 Transmission UE behaviours for SL DRX Samsung Research America
79. R2-2101334 Random selection and partial sensing Samsung Research America
80. R2-2101335 Inter-UE coordination Samsung Research America
81. R2-2101598 DRX coordination between TX and RX UE Xiaomi communications
82. R2-2101599 DRX coordination between Uu and sidelink Xiaomi communications
83. R2-2101600 Discussion on sidelink DRX timer handling Xiaomi communications
84. R2-2101645 On aligning wake-up time between TX and RX UEs MediaTek Inc.
85. R2-2101646 On coordination between Uu DRX and SL DRX MediaTek Inc.
86. R2-2101647 Transmission of assistance information for Mode 2 enhancement MediaTek Inc.
87. R2-2101648 On SL sync search optimization MediaTek Inc.
88. R2-2101650 On Resource Allocation Mode 2 Enhancement for NR Sidelink Convida Wireless
89. R2-2101652 Sidelink DRX Considerations Convida Wireless
90. R2-2101706 Discussion on SL DRX wake-up time alignment between inter-UEs LG Electronics France
91. R2-2101723 Consideration on sidelink DRX for groupcast and broadcast Huawei, HiSilicon
92. R2-2101724 Consideration on resource allocation enhancement in Rel-17 NR SL enhancement Huawei, HiSilicon
93. R2-2101725 General aspects of SL DRX for unicast Huawei, HiSilicon
94. R2-2101726 (Draft) Reply LS on SA2 on PC5 DRX operation LG Electronics France
95. R2-2101727 Summary of [POST112-e][702][SLe] High-level principles for SL DRX LG Electronics France
96. R2-2101756 Discussion on Sidelink DRX ASUSTeK
97. R2-2101762 Consideration on the sidelink DRX for unicast Huawei, Hisilicon
98. R2-2101763 Discussion on SL communication impact on Uu DRX Huawei, Hisilicon
99. R2-2101764 Alignment between Uu DRX and SL DRX Huawei, Hisilicon
100. R2-2101791 Alignment scheme for Uu DRX and SL DRX LG Electronics Inc.
101. R2-2101795 Power efficient resource allocation LG Electronics Inc.
102. R2-2101796 Inter-UE coordination for NR V2X LG Electronics Inc.
103. R2-2101855 Methods for configuring SL DRX relative to Uu DRX Sierra Wireless, S.A.
104. R2-2101866 Methods for aligning SL DRX between UEs Sierra Wireless, S.A.
105. R2-2101869 View on resource selection in mode 2 ITL
106. R2-2102182 Reply LS on PC5 DRX operation RAN2
107. R2-2102183 Summary of [AT113-e][707] OPPO
108. R2-2102184 Summary of [AT113-e][708] Lenovo, Motorola Mobility

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1. R4-2100283 Consideration on partial usage operation with PC5 and Uu in a licensed band LG Electronics France
2. R4-2100284 PC2 MPR/A-MPR simulation assumptions for NR V2X UE in n47 LG Electronics France
3. R4-2100415 Discussion on operating scenarios for partial used SL operation CATT
4. R4-2100416 Discussion on synchronous operation between NR Uu and NR SL CATT
5. R4-2100417 Discussion on system parameters for newly introduced SL bands CATT
6. R4-2100418 Discussion on UE Tx RF requirement for NR SL enhancement CATT
7. R4-2100419 Discussion on UE Rx RF requirement for NR SL enhancement CATT
8. R4-2100420 Discussion on PC2 for SL enhancement CATT
9. R4-2100784 General issues about licensed bands partially used for SL vivo
10. R4-2100785 Discussion on HPUE for NR sidelink enhancement in R17 vivo
11. R4-2101873 on HPUE for V2X RF requirements Xiaomi
12. R4-2101874 on HPUE signalling issue Xiaomi
13. R4-2101875 on operating scenarios for partially used SL operation Xiaomi
14. R4-2101877 Synchronous operation between NR Uu and NR SL in an operating band Xiaomi
15. R4-2101937 Discussion on n47 PC2 MPR simulation of Rel-17 SL enhancement Huawei, Hisilicon
16. R4-2101938 Discussion on the adjacent channel coexistence simulation between SL and Uu in license band Huawei, Hisilicon
17. R4-2102342 Bandwidth for SL operating in n14 Ericsson
18. R4-2102343 Operating scenarios for partially used SL operation Ericsson
19. R4-2102344 coexisting simulation assumption for public safety UC Ericsson
20. R4-2102345 SL UE synchronization issue for licensed operation Ericsson
21. R4-2102346 SL UE Timing mask for Partially used SL operation with NR Uu operating bands Ericsson
22. R4-2103005 Additional Information for SL Operation in NR Band n14 AT&T, FirstNet
23. R4-2103241 Way forward on coexistence evaluation for NR SL enhancement in Rel-17 LG Electronics
24. R4-2103242 Way forward on system parameters and operating CBW in n14 for NR SL enhancement CATT, AT&T
25. R4-2103243 TR38.xxx v0.0.1 TR Skeleton for SL enhancement in Rel-17 LG Electronics
26. R4-2103244 Way forward on TDM operation for SL and Uu in licensed band CATT
27. R4-2103245 Way forward on FDM operation for SL and Uu in licensed band Xiaomi
28. R4-2103246 Way forward on MPR/A-MPR simulation assumption for intra-band V2X con-current operation LG Electronics
29. R4-2103247 Way forward on synchronous operation between Uu and SL in licensed band Ericsson
30. R4-2103249 Way forward on issues related to PC2 NR V2X Huawei
31. R4-2103250 Way forward on simulation assumptions for PC2 NR V2X Huawei
32. R4-2103251 Way forward on co-existence simulation assumptions for PC2 NR V2X CATT
33. R4-2103329 Email discussion summary for [98e][142] NRSL\_enh\_Part\_1 Moderator (LGE)
34. R4-2103330 Email discussion summary for [98e][143] NRSL\_enh\_Part\_2 Moderator (CATT)
35. R4-2103331 Email discussion summary for [98e][144] NRSL\_enh\_Part\_3 Moderator (Huawei)