**3GPP TSG RAN WG1 #118 R1-2407300**

**Maastricht, NL, August 19th – 23rd, 2024**

**Agenda item:** **8.1**

**Sourcce: Moderator (Qualcomm)**

**Title: Moderator Summary #0 on resource allocation for SL PRS**

**Document for:** **Discussion and Decision**

# Introduction

* At RAN#98, a new work item “Expanded and improved NR positioning” (NR\_pos\_enh2) was approved [1]. The relevant WID objective is copied here for convenience:

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| * Specify solutions for support of sidelink positioning (including ranging) in NR systems, including the following [RAN1, RAN2, RAN3, RAN4]:   + Specify SL PRS for support of sidelink positioning such that the SL PRS uses a comb-based (full RE mapping pattern is not precluded) frequency domain structure and a pseudorandom-based sequence where the existing sequence of DL-PRS is used as a starting point [RAN1].     - Specify support for SL PRS bandwidths of up to 100 MHz in FR1 spectrum.     - NOTE: SL PRS transmission in FR2 is not precluded but no FR2 specific aspects will be specified.   + Specify measurements to support RTT-type solutions using SL, SL-AoA, and SL-TDOA [RAN1, RAN2].   + Specify support of resource allocation for SL PRS:     - Including resource allocation Scheme 1 and Scheme 2, where Scheme 1 corresponds to a network-centric SL PRS resource allocation and Scheme 2 corresponds to UE autonomous SL PRS resource allocation [RAN1].       * For resource allocation mechanism for SL PRS in Scheme 2:         + Study and specify support of sensing-based resource allocation, and/or a random resource selection [RAN1].         + Study and specify solutions for congestion control for SL PRS and/or inter-UE coordination for SL-PRS [RAN1].     - Support resource allocation for shared resource pool with Rel-16/17/18 sidelink communication and dedicated resource pool for SL PRS [RAN1].       * NOTE: For SL positioning resource (pre)-configuration in a shared resource pool with Rel-16/17/18 sidelink communication, backward compatibility with legacy Rel-16/17 UEs should be ensured.   + Specify procedures for transmit power control for SL PRS transmissions at least based on open loop power control (OLPC) [RAN1].   + Specify signalling and associated UE behavior for support of unicast, groupcast (not including many to one) and broadcast of SL PRS transmissions [RAN1, RAN2].   + Specify reporting signalling and procedures to facilitate support of SL positioning in all coverage scenarios and for PC5-only and joint PC5-Uu scenarios [RAN2, RAN3]:     - Specify the protocol and procedures for SL positioning between UEs (Protocol for Sidelink positioning procedures (SLPP)).     - Specify the protocol and procedures for SL positioning between UEs and LMF.   + Specify signalling to NG-RAN for sidelink positioning and ranging service authorizations as needed. [RAN3, RAN2]   + Specify corresponding new core requirements, as well as identifying and specify the impact on the existing RAN4 specification, including RRM measurements and procedures [RAN4]. |

In this contribution, we present the summary of the documents submitted in this subagenda related to SL PRS Resource Allocation

# Corrections on positioning (Sec 8.2.4.2 of TS 38.214), R1-2406956, ZTE, Sanechips

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| ***Reason for change:*** | | **Sidelink positioning (8.2.4.2, 8.4.4):**   1. In SL PRS resource allocation mode 2, the sensing unit is a candidate SL PRS resource, but currently in TS 38.214, the definition of candidate SL PRS resource is wrongly written as candidate single slot resource, wherein the candidate single slot resource is only used for SL data. (8.2.4.2) |
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| ***Summary of change:*** | | **Sidelink positioning (8.2.4.2, 8.4.4):**   1. Correct the description for UE procedure in SL PRS resource allocation mode 2. (8.2.4.2) |
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| ***Consequences if not approved:*** | | **Sidelink positioning (8.2.4.2, 8.4.4):**   1. The description for the UE procedure in SL PRS resource allocation mode 2 is not correct. (8.2.4.2) |
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| <omitted text> 8.2.4.2 UE procedure for determining the subset of resources to be reported to higher layers in SL PRS resource selection in a dedicated SL PRS resource pool in sidelink resource allocation mode 2 <omitted text>  The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - "packet delay budget" is replaced by "SL PRS delay budget",  - partial sensing is not applicable in a dedicated SL PRS resource pool,  - "candidate single-slot resource" is replaced by "candidate SL PRS resource",  - a candidate SL PRS resource for transmission is defined as the SL PRS resource with index within the Set of SL-PRS resource ID(s) provided by the higher layer and in slot ,  - "SCI format 1-A" is replaced by "SCI format 1-B",  - in step 5, the second condition is modified as follows: for any periodicity value allowed by the higher layer parameter *sl-PRS-ResourceReservePeriodList* and any SL PRS resource ID in the set of SL PRS resource ID(s) provided by the higher layer, and a hypothetical SCI format 1-B received in slot with '*Resource reservation period*' field set to that periodicity value and indicating that SL-PRS resource ID, condition c in step 6 would be met,  - In condition b of step 6, the RSRP measurement is the PSCCH-RSRP over the DM-RS resource elements of the PSCCH;  - In condition c of step 6 "determines according to clause 8.1.5 the set of resource blocks and slots" is replaced by "determines according to clause 8.2.4.2A the set of SL PRS resources and slots ".  <omitted text> |

Feature Lead Propoposal 1-v0

Support the above proposal. Please comment if you disagree with the above CR.

Companies views

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| CATT | Not needed.  According the the following highlighted sentence in clause 8.2.4.2 of the spec, the "candidate single-slot resource" should be replaced by "candidate SL PRS resource" in clause 8.1.4, hence the change is not needed.   |  | | --- | | The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - "packet delay budget" is replaced by "SL PRS delay budget",  - partial sensing is not applicable in a dedicated SL PRS resource pool,  - "candidate single-slot resource" is replaced by "candidate SL PRS resource", | |
| ZTE | We have different understanding with CATT and we think this CR is necessary.  Indeed we understand that "candidate single-slot resource" is replaced by "candidate SL PRS resource". but there is no definition for a candidate SL PRS resource. If we we redefine single-slot resource in 8.2.4.2, then there is no need to replace it with candidate SL PRS resource.   |  | | --- | | The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - "packet delay budget" is replaced by "SL PRS delay budget",  - partial sensing is not applicable in a dedicated SL PRS resource pool,  - "candidate single-slot resource" is replaced by "candidate SL PRS resource",  - a candidate single-slot resource for transmission is defined as the SL PRS resource with index within the Set of SL-PRS resource ID(s) provided by the higher layer and in slot , | |
| Huawei, HiSilicon | Ok for alignment CR. |
| Nokia | OK for alignment CR |

# Higher layer parameters in a dedicated SL PRS resource pool, R1-2406335, CATT, CICTCI

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***Proposal 1: Send LS to RAN2 to capture the relevant parameter affecting the PSCCH DMRS sequence generation in a dedicated SL PRS resource pool.***

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| **Sub-feature group** | **RAN1 specification** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** |
| PSCCH in a dedicated resource pool | 38.211 | DMRS-ScrambleID-DedicatedSL-PRS-RP | New | PSCCH DMRS generation | INTEGER (0..65535) | Per dedicated SL PRS resource pool | Yes | 38.331 |

***Proposed 2: Modify the description on PSCCH DMRS sequence generation in TS 38.211 as TP #1.***

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| * **TP #1**  |  |  | | --- | --- | | ***Reason for change:*** | The procedure of PSCCH DMRS sequences generation in a dedicated SL PRS resource pool is missing. | |  |  | | ***Summary of change:*** | In clause 8.4.1.3.1 of TS 38.211, capture the higher layer parameter for PSCCH DMRS sequences generation in a dedicated SL PRS resource pool. | |  |  | | ***Consequences if not approved:*** | The agreement on PSCCH DMRS sequences generation in a dedicated SL PRS resource pool is not correctly captured. |   --------------------------------------- Start of text proposal to TS 38.211 v18.3.0 --------------------------------------------  8.4.1.3.1 Sequence generation  The sequence shall be generated according to  where the pseudo-random sequence is defined in clause 5.2.1. The pseudo-random sequence generator shall be initialized with  where  - is the OFDM symbol number within the slot,  - is the slot number within a frame, and  -  is given by the higher-layer parameter *sl-DMRS-ScrambleID*, or is given by the higher-layer parameter *DMRS-ScrambleID-DedicatedSL-PRS-RP* when the resource pool is a dedicated SL PRS resource pool.  ---------------------------------------- End of text proposal to TS 38.211 v18.3.0 -------------------------------------------- |

Feature Lead Comment 2-v0

Please comment if you disagree with the above LS and/or CR.

Companies views

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| Huawei, HiSilicon | Might be ok with the LS to RAN2. However, the CR can comeback later once RAN2 confirms and adds the parameter just in case RAN2 may not take this name exactly as RAN1’s CR suggested. |
| Nokia | Tend to agree with Huawei, HiSilicon |

# Draft CR on DCI format 3\_2 for SL PRS scheduling, R1-2406166, vivo

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| ***Reason for change:*** | SL PRS and PSCCH should always be scheduled together, and DCI 3\_0 is used for scheduling of NR PSCCH and NR PSSCH in one cell, or scheduling of NR PSCCH, NR PSSCH and NR SL PRS for a shared SL PRS resource pool in one cell. In this case, refer to the description of DCI 3\_0 below, the DCI 3\_2 is used for scheduling of NR PSCCH and NR SL PRS together other than SL PRS only.   |  | | --- | | DCI format 3\_0 is used for scheduling of NR PSCCH and NR PSSCH in one cell, or scheduling of NR PSCCH, NR PSSCH and NR SL PRS for a shared SL PRS resource pool in one cell. | |
|  |  |
| ***Summary of change:*** | Update the DCI format 3\_2 used for scheduling of NR PSCCH and NR SL PRS |
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| ***Consequences if not approved:*** | Incomplete capture of the function of DCI format 3\_2. |

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| 7.3.1.4.3 Format 3\_2 DCI format 3\_2 is used for scheduling of NR PSCCH and NR SL PRS for a dedicated SL PRS resource pool in one cell.  The following information is transmitted by means of the DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI or SL-PRS-CS-RNTI:  - Resource pool index - bits, where *I* is the total number of dedicated SL PRS resource pools for transmission configured by the higher layer parameter *sl-PRS-TxPoolScheduling*, if configured.  - Time gap - 3 bits determined by higher layer parameter *sl-DCI-ToSL-Trans,* as defined in clause 8.2.4.1.1 of [6, TS 38.214]  - First SL PRS indicator - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources within a slot in a dedicated SL PRS resource pool and provided by the higher layer parameter *sl-PRS-ResourcesDedicatedSL-PRS-RP*.  - SCI format 1-B fields according to clause 8.3.1.2:  - Time resource assignment  - Resource ID indication  - Configuration index – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled by SL-PRS-CS-RNTI; otherwise 3 bitsas defined in clause 8.2.4.1 of [6, TS 38.214]. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-PRS-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI.  - Activation/release indication – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled with SL-PRS-CS-RNTI; otherwise 1 bit, where value 0 indicates release and value 1 indicates activation. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled with SL-PRS-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI.  - Padding bits, if required.  If the total number of transmit resource pools provided in *sl-PRS-TxPoolScheduling*, if configured, is larger than one, zeros shall be appended to the DCI format 3\_2 until the payload size is equal to the size of a DCI format 3\_2 given by a configuration of the transmit resource pool resulting in the largest number of information bits for DCI format 3\_2.  If the UE is configured to monitor DCI format 3\_0 and/or DCI format 3\_1 and the number of information bits in DCI format 3\_2 is less than the larger payload size of DCI format 3\_0 if configured and DCI format 3\_1 if configured, zeros shall be appended to DCI format 3\_2 until the payload size equals the larger payload size of DCI format 3\_0 if configured and DCI format 3\_1 if configured.  <omitted text> |

Feature Lead Comment 3-v0

Please comment if you disagree with the above CR

Companies views

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| Huawei, HiSilicon | Not strictly needed but fine to take it for alignment. |
| Nokia | OK for alignment CR |

17 Proposal for Online Discussion

Feature Lead Propoposal 1-v1

Support the following change in TS 38.214 as part of the alignment CR:

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| <omitted text> 8.2.4.2 UE procedure for determining the subset of resources to be reported to higher layers in SL PRS resource selection in a dedicated SL PRS resource pool in sidelink resource allocation mode 2 <omitted text>  The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - "packet delay budget" is replaced by "SL PRS delay budget",  - partial sensing is not applicable in a dedicated SL PRS resource pool,  - "candidate single-slot resource" is replaced by "candidate SL PRS resource",  - a candidate SL PRS resource for transmission is defined as the SL PRS resource with index within the Set of SL-PRS resource ID(s) provided by the higher layer and in slot ,  - "SCI format 1-A" is replaced by "SCI format 1-B",  - in step 5, the second condition is modified as follows: for any periodicity value allowed by the higher layer parameter *sl-PRS-ResourceReservePeriodList* and any SL PRS resource ID in the set of SL PRS resource ID(s) provided by the higher layer, and a hypothetical SCI format 1-B received in slot with '*Resource reservation period*' field set to that periodicity value and indicating that SL-PRS resource ID, condition c in step 6 would be met,  - In condition b of step 6, the RSRP measurement is the PSCCH-RSRP over the DM-RS resource elements of the PSCCH;  - In condition c of step 6 "determines according to clause 8.1.5 the set of resource blocks and slots" is replaced by "determines according to clause 8.2.4.2A the set of SL PRS resources and slots ".  <omitted text> |

Feature Lead Propoposal 1-v1

***Send LS to RAN2 to capture the following parameter used for the PSCCH DMRS sequence generation in a dedicated SL PRS resource pool:***

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| **Sub-feature group** | **RAN1 specification** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** |
| PSCCH in a dedicated resource pool | 38.211 | DMRS-ScrambleID-DedicatedSL-PRS-RP | New | PSCCH DMRS generation | INTEGER (0..65535) | Per dedicated SL PRS resource pool | Yes | 38.331 |

Feature Lead Propoposal 1-v1

Support the following change in TS 38.212 as part of the calignment CR:

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| 7.3.1.4.3 Format 3\_2 DCI format 3\_2 is used for scheduling of NR PSCCH and NR SL PRS for a dedicated SL PRS resource pool in one cell.  The following information is transmitted by means of the DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI or SL-PRS-CS-RNTI:  - Resource pool index - bits, where *I* is the total number of dedicated SL PRS resource pools for transmission configured by the higher layer parameter *sl-PRS-TxPoolScheduling*, if configured.  - Time gap - 3 bits determined by higher layer parameter *sl-DCI-ToSL-Trans,* as defined in clause 8.2.4.1.1 of [6, TS 38.214]  - First SL PRS indicator - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources within a slot in a dedicated SL PRS resource pool and provided by the higher layer parameter *sl-PRS-ResourcesDedicatedSL-PRS-RP*.  - SCI format 1-B fields according to clause 8.3.1.2:  - Time resource assignment  - Resource ID indication  - Configuration index – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled by SL-PRS-CS-RNTI; otherwise 3 bitsas defined in clause 8.2.4.1 of [6, TS 38.214]. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-PRS-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI.  - Activation/release indication – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled with SL-PRS-CS-RNTI; otherwise 1 bit, where value 0 indicates release and value 1 indicates activation. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled with SL-PRS-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI.  - Padding bits, if required.  If the total number of transmit resource pools provided in *sl-PRS-TxPoolScheduling*, if configured, is larger than one, zeros shall be appended to the DCI format 3\_2 until the payload size is equal to the size of a DCI format 3\_2 given by a configuration of the transmit resource pool resulting in the largest number of information bits for DCI format 3\_2.  If the UE is configured to monitor DCI format 3\_0 and/or DCI format 3\_1 and the number of information bits in DCI format 3\_2 is less than the larger payload size of DCI format 3\_0 if configured and DCI format 3\_1 if configured, zeros shall be appended to DCI format 3\_2 until the payload size equals the larger payload size of DCI format 3\_0 if configured and DCI format 3\_1 if configured.  <omitted text> |

# 20 References

# 21 Previous Agreements for SL Positioning Solutions

## RAN1 #109-e

**Agreement**

Study power control mechanisms for SL-PRS transmission, including whether it is necessary.

**Agreement**

With regards to the Positioning methods supported using SL measurements study further the following methods:

* + RTT-type solutions using SL
    - Study both single-sided (also known as one-way) and double-sided (also known as two-way) RTT
  + SL-AoA
    - Include both Azimuth of arrival (AoA) and zenith of arrival (ZoA) in the study
  + SL-TDOA
  + SL-AoD
    - Corresponds to a method where RSRP and/or RSRPP measurements similar to the DL-AoD method in Uu.
    - Include both Azimuth of departure (AoD) and zenith of departure (ZoD) in the study
* Consider in the study at least the following aspects:
  + Definition(s) of the corresponding SL measurements for each method
  + Which method is applicable to absolute or relative positioning or ranging, including whether such categorization is needed to be discussed.
  + For angle-based methods, antenna configuration consideration(s) using practical UE capabilities
  + Per-panel location, if UE uses multiple panels.
  + UE’s mobility, especially for V2X scenarios
  + Impact of synchronization error(s) between UEs
  + Existing SL measurements (e.g. RSSI, RSRP), and UE ID information etc, may be used.
* Note: The above categorization does not necessarily mean that there will be separate SL positioning methods specified, or whether there will be a unified SL Positioning method.
* Note: When the study of carrier phase positioning and the evaluations of sidelink positioning have progressed, it can be reviewed whether carrier phase for sidelink can be considered in further work. Checkpoint at RAN1#110-e-Bis to see if sufficient information is available for this review.
* Note: Companies are encouraged to describe the role of SL nodes and their interaction/coordination participating in each method.

**Agreement**

With regards to the numerologies of the SL-PRS, limit the study to those supported for NR Sidelink.

* Note 1: NR Sidelink supports {15, 30, 60 kHz} in FR1 and {60, 120 kHz} in FR2
* Note 2: This doesn’t imply that SL-PRS FR2-specific optimization(s) are expected to be studied

**Agreement**

Study new reference signal for SL positioning/ranging using the existing PRS/SRS design and SL design framework as a starting point.

* The study could at least include: Sequence design, frequency domain pattern, time domain pattern (e.g. number of symbols, repetitions, etc), time domain behavior, configuration/triggering/activation/de-activation of the SL-PRS, AGC time, Tx-Rx Turanround time, supportable bandwidth(s), multiplexing options with other SL channels, randomization/orthogonalization options.
* Note: The study of existing SL reference signal for SL positioning/ranging is not precluded. Companies are encouraged to perform performance evaluation/comparison to investigate whether such reference signals can meet the positioning accuracy requirements.

**Agreement**

With regards to the configuration/activation/deactivation/triggering of SL-PRS, study the following options:

* Option 1: High-layer-only signaling involvement in the SL-PRS configuration
  + No Lower layer involvement, e.g., SL-MAC-CE or SCI or DCI, for the activation or the triggering of a SL-PRS.
  + Based on the study, this option may correspond to
    - A SL-PRS configuration that is a single-shot or multiple shots
    - A high-layer configuration that may be received from an LMF, a gNB, or a UE
* Option 2: High-layer and lower-layer signaling involvement in the SL-PRS configuration
  + Lower-layer may correspond to SL-MAC-CE, or SCI, or DCI
  + For example, high layer signaling can may be used for SL-PRS configuration and lower layer signaling can may be used for initiating SL positioning and/or configuration/triggering/activating/deactivating/indicating and potential resource indication/reservation transmission of SL-PRS.
* Option 3: Only lower-layer signaling involvement in the SL-PRS configuration
  + Lower-layer may correspond to SL-MAC-CE, or SCI, or DCI
* Note 1: Include aspects in the study related to flexibility, overhead, latency, and reliability as/if needed.

**Agreement**

With regards to the Sidelink Positioning measurement report,

* Study the contents of the measurement report (e.g. time stamp(s), quality metric(s), ID(s), angular/timing/power measurements, etc)
* Study the time domain behavior of the measurement report (e.g. one-shot, triggered, aperiodic, semi-persistent, periodic)
* FFS whether the Sidelink Positioning measurement can be a high-layer report and/or a lower layer report.

**Agreement**

For the purpose of RAN1 discussion during this study item, at least the following terminology is used:

* **Target UE**: UE to be positioned (in this context, using SL, i.e. PC5 interface).
* **Sidelink positioning**: Positioning UE using reference signals transmitted over SL, i.e., PC5 interface, to obtain absolute position, relative position, or ranging information.
* **Ranging**: determination of the distance and/or the direction between a UE and another entity, e.g., anchor UE.
* **Sidelink positioning reference signal (SL PRS)**: reference signal transmitted over SL for positioning purposes.
* **SL PRS (pre-)configuration**: (pre-)configured parameters of SL PRS such as time-frequency resources (other parameters are not precluded) including its bandwidth and periodicity.
* Continue discussion on additional terminology clarification(s) such as: Initiator UE, Responder UE, Sidelink Positioning group, reference UE, etc, including whether such terminology is needed within RAN1 discussion.

**Agreement**

For the purpose of RAN1 discussion during this study item, at least the following terminology is used:

* **Anchor UE**: UE supporting positioning of target UE, e.g., by transmitting and/or receiving reference signals for positioning, providing positioning-related information, etc., over the SL interface.
  + FFS: clarification of the knowledge of the location of the anchor UE

**Agreement**

With regards to the frequency domain pattern, study further a Comb-N SL-PRS design. Study at least the following aspects:

* N>=1 (where N=1 corresponds to full RE mapping pattern)
* Fully staggered SL-PRS pattern (e.g., M symbols of SL-PRS with comb-N with M=N and, at each symbol a different RE offset is used), Partially staggered SL-PRS pattern (e.g., M symbol(s) of SL-PRS with comb-N, with M<N, at each symbol a different RE offset is used), Unstaggered SL-PRS patterns (e.g., M symbol(s) of SL-PRS with comb- N, at each symbol a same RE offset is used, N > 1)
* The number of symbols of SL-PRS within a slot
  + Any relation to the comb-N option
  + RE offset pattern repetitions within a slot
* FFS: Other frequency domain pattern(s)

**Agreement**

For a potential new SL PRS, study further the following

* Number of symbol(s) for AGC and/or Rx-Tx turnaround time
* Conditions under which AGC training and/or Rx-Tx turnaround time are needed

**Agreement**

With regards to the SL Positioning resource allocation, study further the following 2 options for SL Positioning resource (pre-)configuration:

* Option 1: Dedicated resource pool for SL-PRS
  + Include in the study at least the following aspects:
    - which slots can be used, SL frame structure, SL positioning slot structure, multiplexing of SL-PRS with control information (if included in the same slot)
    - positioning measurement report
    - whether a dedicated frequency allocation (e.g., layer/BWP) is needed for SL PRS
    - resource allocation procedure(s) of SL-PRS
    - This option may or may not include control information (i.e., configuration/activation/deactivation/triggering of SL-PRS) for the purpose of SL positioning operation
* Option 2: Shared resource pool with sidelink communication.
  + Include in the study at least the following aspects:
    - co-existence between SL communication and SL positioning, backward compatibility
    - Multiplexing considerations of SL-PRS with other PHY channels (PSCCH, PSSCH, PSFCH) and any modifications in the SL-slot structure

**Agreement**

With regards to the SL-PRS resource allocation, study the following two schemes:

* Scheme 1: Network-centric operation SL-PRS resource allocation (e.g. similar to a legacy Mode 1 solution)
  + The network (e.g. gNB, LMF, gNB & LMF) allocates resources for SL-PRS
* Scheme 2: UE autonomous SL-PRS resource allocation (e.g. similar to legacy Mode 2 solution)
  + At least one of the UE(s) participating in the sidelink positioning operation allocates resources for SL-PRS
  + Applicable regardless of the network coverage
* FFS: potential mechanisms, if needed, for SL-PRS resource coordination across a number of transmitting UEs (e.g. IUC-like solutions).
* Note: Other Schemes are not precluded to be studied
* FFS how to handle resource allocation of SL-Positioning measurement report

## RAN1 #110-e

Agreement

With regards to the Positioning methods supported using at least SL measurements, potential candidate positioning methods include at least the following:

* + RTT-type solution(s) using SL
  + SL-AoA
  + SL-TDOA
* Note: other methods can still be studied
* Note: The above categorization does not necessarily mean that there will be separate SL positioning methods specified.

Agreement

A new reference signal should be introduced for supporting SL positioning/ranging.

Agreement

Regarding SL-PRS resource allocation, both Scheme 1 and Scheme 2 should be introduced for supporting SL positioning/ranging:

* Scheme 1: Network-centric operation SL-PRS resource allocation (e.g. similar to a legacy Mode 1 solution)
  + The network (e.g. gNB, LMF, gNB & LMF) allocates resources for SL-PRS.
* Scheme 2: UE autonomous SL-PRS resource allocation (e.g. similar to legacy Mode 2 solution)
  + At least one of the UE(s) participating in the sidelink positioning operation allocates resources for SL-PRS

Agreement

With regards to the SL Positioning resource allocation, one of the following alternatives should be introduced for supporting SL positioning/ranging:

* Alt. 1: only dedicated resource pool(s) can be (pre-)configured for SL-PRS
* Alt. 2: either dedicated resource pool(s) and/or ~~a~~ shared resource pool(s) with sidelink communication can be (pre-)configured for SL-PRS
* Note: whether other signals/channels can be present in the dedicated resource pool can be further discussed

Agreement

For the content of the sidelink positioning measurement report, potential elements may include at least the following:

* One or more sidelink positioning measurement(s)
* Timestamp(s) associated with a sidelink positioning measurement
* Quality metric(s) associated with a sidelink positioning measurement
* Identification Information for a sidelink positioning measurement
* FFS any detail for the above

Agreement

For the sequence of the new reference signal for SL positioning/ranging, down select between Alt 1 and Alt 2:

* Alt. 1: pseudorandom-based. Use existing sequence of DL-PRS as a starting point.
* Alt. 2: ZC-based (SRS sequence as a starting point)

Agreement

With regards to the frequency domain pattern, a Comb-N SL-PRS occupying M symbol(s) design should be introduced for the support of NR SL positioning

* Note: there could be multiple values for M, N

Agreement

Regarding Scheme 2 SL-PRS resource allocation, study at least the following aspects:

* Resource selection mechanism for SL-PRS
* Inter-UE coordination
* Aspects for congestion control mechanisms for SL-PRS

Agreement

* With regards to the configuration/activation/deactivation/triggering of SL-PRS, Option 3 from the previous corresponding RAN1 #109 agreement will not be considered further.
* With regards to reservation of SL-PRS, it can be considered based on the Option 1 or Option 2 from the previous corresponding RAN1 #109 agreement.

Agreement

With regards to the frequency domain pattern for multi-symbol SL-PRS, prioritize partially and fully staggered SL-PRS.

* Note: this does not preclude comb N=1
* FFS: single symbol SL-PRS, if supported

## RAN1 #110-bis-e

**Agreement**

* With regards to the RTT-type solutions using SL, down-select between the following 2 alternatives:
  + Alt. 1: it corresponds to a single-sided RTT method
  + Alt. 2: it may correspond to either a single-sided or double-sided RTT method
    - With regards to the double-sided RTT,
      * companies are encouraged to analyze and evaluate the effect in performance for the single-sided SL RTT due to clock drift
      * Study the order of the SL-PRS transmissions for double-sided RTT
      * Study the impact of UE mobility
    - FFS study whether there is or what is the spec impact of double-sided RTT method
* Note: the above may correspond to RTT with one or multiple devices

**Agreement**

For the study of SL-AoA positioning method,

* Both SL Azimuth of arrival (AoA) and SL zenith of arrival (ZoA) measurement should be included
  + FFS: Definition of the measurements
* Study further whether other measurements can be applicable
* Study further the frame of reference (LCS or GCS)

**Agreement**

With regards to SL-TDOA positioning method for SL-only positioning,

* It corresponds to a method where SL-PRS is being transmitted from multiple anchor UEs to a target UE (i.e., DL-TDOA-like operation), and/or from a target UE to multiple anchor UEs (i.e. UL-TDOA-like operation) at least for the purpose of absolute positioning estimation of the target UE
* Study the detailed procedure, necessary signalling for SL-TDOA, method(s) to mitigate impact of synchronization error between multiple anchor UEs including whether such method(s) are needed.

**Agreement**

* From the potential candidate Positioning methods using at least SL measurements, at least the following should be introduced:
  + RTT-type solution(s) using SL
  + SL-AoA
  + SL-TDOA
* FFS: SL-AoD

**Agreement**

Regarding Scheme 1 SL-PRS resource allocation, a transmitting UE receives a SL-PRS resource allocation signaling from the network. Consider one or more of the following options:

* Opt. 1: through higher layers from the LMF
* Opt. 2: through Dynamic grant, or through configured grant type 1/type 2 from gNB
  + Up to further discussion which one or more of these shall be applicable

**Agreement**

For the sequence of the new reference signal for SL positioning/ranging, use

* Alt. 1: pseudorandom-based. Use existing sequence of DL-PRS as a starting point.

**Agreement**

From RAN1 perspective, the following cast types of SL-PRS transmission can be introduced for SL positioning: Unicast, Groupcast (not including many to one)

* Broadcast (as a working assumption).
* FFS: Applicability of the above cast types

Agreement

With regards to the frequency and time domain pattern of a *SL-PRS resource* within a slot has the following characteristics:

* With regards to the value N (comb size) and the number M of SL-PRS symbols within a slot *excluding* the symbol(s) used for AGC training / RxTx Turnaround:
  + At least the following values are considered as potential candidate values: N = {1,2,4,6,8,12}
  + FFS: the values considered as potential candidate values for M
  + FFS1: Whether to consider N>12 as a potential candidate value(s)
* The symbols of a SL-PRS resource within a slot are consecutive symbols
  + FFS: consecutive and/or non-consecutive symbols for shared resource pool (if supported)
* FFS: RE-Offset sequence within a SL-PRS resource, including whether to have in the end of the SL-PRS pattern a symbol with the same RE-offset as the first symbol, for phase-tracking purpose

Agreement

For a dedicated resource pool for SL positioning,

* With regards to which channels can be included in the resource pool in addition to SL-PRS, consider the following options:
  + Opt. 1: No other channel can be included beyond SL-PRS
  + Opt. 2: PSCCH which carries SCI associated with SL-PRS transmission(s) is included
  + Opt. 3: PSCCH which carries SCI associated with SL-PRS transmission(s) and PSSCH associated with SL-PRS transmission(s) are included
    - FFS: Details
    - FFS: definition of PSSCH associated with SL-PRS transmission(s)
* Note: Companies are encouraged to provide their analysis and views on the above

Agreement

With regards to the SL Positioning resource allocation, for SL Positioning resource (pre-)configuration in a shared resource pool with Rel-16/17/18 sidelink communication (if supported), backward compatibility with legacy Rel-16/17 UEs should be ensured.

Agreement

With regards to SL signaling of the reservation/indication of SL-PRS resource(s) for dedicated resource pool and shared resource pool (if supported) for positioning:

* Option A.1: SCI can be used for reserving/indicating one or more SL-PRS resource(s)
  + Note: This does NOT mean that only SCI is being used. There can still be higher layer signaling for the purpose of indicating a part of SL-PRS configuration.
  + FFS: Whether SCI is single stage SCI or two stage SCI
* FFS: SL-MAC-CE or other higher-layer signaling reservation/indication

Agreement

With regards to the Positioning methods supported using SL-PRS measurements

* at least the following measurements are considered:
  + SL Rx-Tx measurement
  + SL RSTD measurement
  + SL RSRP measurement
  + SL RSRPP measurement
  + SL RTOA measurement
  + SL Azimuth of arrival (AoA) and SL zenith of arrival (ZoA) measurement
* Companies are encouraged to study other measurements (e.g., time difference of arrival of 2 SL-PRS transmitted at 2 different times from the same anchor) and provide their analysis into why they are needed in light of the above measurements.
* Companies are encouraged to study potential enhancements, such as SL Rx-Tx measurement not being reported but the transmit time of SL-PRS being adjusted based on the measurement
* FFS any additional measurements

Agreement

At least for a dedicated resource pool for positioning,

* With regards to the bandwidth of SL-PRS transmission, downselect from the following alternatives:
  + Alt. 1: The bandwidth of SL-PRS can be same or smaller than that of the resource pool
  + Alt. 2: The bandwidth of SL-PRS shall be the same as that of the resource pool
* Note: Companies are encouraged to provide their analysis and views on the above alternatives
* FFS: Bandwidth of SL-PRS transmission for shared resource pool (if supported)

Agreement

Study further the granularity of time-domain resource allocation for SL-PRS transmission.

Agreement

With regards to the SL-PRS time domain behavior, at least study the following behaviors from Tx UE perspective:

* Periodic SL-PRS
  + SL-PRS is transmitted periodically with a transmission periodicity
  + FFS: any additional details, including whether or not higher layers can start/stop transmission.
* Semi-persistent SL-PRS
  + SL-PRS is transmitted periodically with a transmission periodicity after activation and until deactivation
  + FFS: any additional details
* Aperiodic SL-PRS
  + SL-PRS is transmitted at least once after [triggering/request]
    - Note: the brackets in the above means that companies are encouraged to study further whether “triggering” and/or “request” should be used and provide their definitions.
  + FFS: any additional details
* FFS: Applicability of the above time behaviors for scheme 1 & scheme 2
* FFS: Rx UE behavior is separately discussed.
* FFS: What mechanism(s) are used for activation/deactivation/triggering is part of the study

## RAN1 #111

**Agreement**

* SL-AoD is included as a potential candidate positioning method, and
* SL-AoD should be deprioritized over the remaining methods that have been recommended to be introduced.

**Agreement**

With regards to the SL Positioning resource allocation, support

* Alt. 2: either dedicated resource pool(s) and/or a shared resource pool(s) with sidelink communication can be (pre-)configured for SL-PRS.
* Note: this does not imply that the design is the same for both types of resources pools
* Note: shared resources pool(s) should be supported with backward compatibility

**Agreement**

From RAN1 perspective, at least the following 2 operation scenarios are recommended for normative work:

* Operation Scenario 1: PC5-only-based positioning.
* Operation Scenario 2: Combination of Uu- and PC5-based positioning.

**Agreement**

* For Scheme 2, with regards to Resource allocation mechanism for SL-PRS, pick one or both of the following options:
* Option 1: A sensing based resource allocation should be introduced
* Option 2: A random resource selection should be introduced
* In either option 1 or 2, the legacy designs for UE autonomous resource allocation should be used as a starting point. Study if/what enhancements may be needed.

**Agreement**

With regards to the RTT-type solutions using SL, both single-sided and double-sided RTT methods should be introduced

* Strive to minimize the changes needed on top of the specification support for single-sided RTT, if any, for the introduction of double-sided RTT.
* Note: a UE should be able to support single-sided RTT without having to support double-sided RTT

Agreement

Capture the following TP into the TR 38.859 as a conclusion:

For the solutions for sidelink positioning,

* The following 2 operation scenarios are recommended for normative work
  + Operation Scenario 1: PC5-only-based positioning.
  + Operation Scenario 2: Combination of Uu- and PC5-based positioning.
* RTT-type solution(s) using SL, SL-AoA and SL-TDOA are recommended for normative work.
  + both single-sided and double-sided RTT methods, striving to minimize the changes needed on top of the specification support for single-sided RTT, if any, for the introduction of double-sided RTT
* A new sidelink reference signal (SL-PRS) is recommended for normative work.
  + Such a reference signal should use a Comb frequency domain structure and a pseudorandom-based sequence where the existing sequence of DL-PRS should be used as a starting point.
  + SCI can be used for reserving/indicating one or more SL-PRS resources
* Both a resource allocation Scheme 1 and Scheme 2 is recommended for normative work, where Scheme 1 corresponds to a network-centric operation SL-PRS resource allocation and Scheme 2 corresponds to UE autonomous SL-PRS resource allocation.
* With regards to the SL-PRS transmission, both dedicated resource pool and shared resource pool with Rel-16/Rel-17/Rel-18 SL communication are recommended for normative work.
  + For SL Positioning resource (pre-)configuration in a shared resource pool with Rel-16/17/18 sidelink communication, backward compatibility with legacy Rel-16/17 UEs should be ensured.
* Unicast, Groupcast (not including many to one) and Broadcast of SL-PRS transmission are recommended for normative work.

Agreement

A dedicated SL-PRS resource pool is (pre-)configured in the only SL BWP of a carrier.

Agreement

With regards to the power control for SL-PRS at least Open Loop PC should be introduced.

**Agreement**

For SL-TDOA, DL-TDOA-like operation and UL-TDOA-like operation should be introduced.

* A UE is not required to support both DL-TDOA-like operation and UL-TDOA-like operation

**Agreement**

With regards to the Positioning methods supported using SL-PRS measurements

* at least the following measurements should be introduced:
  + SL-PRS based Rx-Tx measurement
  + SL-PRS based RSTD measurement
  + SL-PRS based RSRP measurement
  + SL-PRS based RSRPP measurement
  + SL-PRS based RTOA measurement
  + SL-PRS based Azimuth of arrival (AoA) and SL zenith of arrival (ZoA) measurement

Agreement

Update the agreed TP into the conclusion section of the TR 38.859 as follows:

For the solutions for sidelink positioning,

* The following 2 operation scenarios are recommended for normative work
  + Operation Scenario 1: PC5-only-based positioning.
  + Operation Scenario 2: Combination of Uu- and PC5-based positioning.
* RTT-type solution(s) using SL, SL-AoA and SL-TDOA are recommended for normative work.
  + both single-sided and double-sided RTT methods, striving to minimize the changes needed on top of the specification support for single-sided RTT, if any, for the introduction of double-sided RTT
  + For SL-TDOA, DL-TDOA-like operation and UL-TDOA-like operation is recommended for normative work.
  + For the support of the above methods the following measurements are recommended for normative work:
    - SL-PRS based Rx-Tx measurement
    - SL-PRS based RSTD measurement
    - SL-PRS based RSRP measurement
    - SL-PRS based RSRPP measurement
    - SL-PRS based RTOA measurement
    - SL-PRS based Azimuth of arrival (AoA) and SL zenith of arrival (ZoA) measurement
* A new sidelink reference signal (SL-PRS) is recommended for normative work.
  + Such a reference signal should use a Comb frequency domain structure and a pseudorandom-based sequence where the existing sequence of DL-PRS should be used as a starting point.
  + SCI can be used for reserving/indicating one or more SL-PRS resources
  + With regards to the power control for SL-PRS at least Open Loop PC is recommended for normative work.
* Both a resource allocation Scheme 1 and Scheme 2 is recommended for normative work, where Scheme 1 corresponds to a network-centric operation SL-PRS resource allocation and Scheme 2 corresponds to UE autonomous SL-PRS resource allocation.
  + For resource allocation mechanism for SL-PRS in Scheme 2, a sensing based resource allocation, or a random resource selection, or both, should be introduced, where the legacy designs for UE autonomous resource allocation are used as a starting point.
* With regards to the SL-PRS transmission, both dedicated resource pool and shared resource pool with Rel-16/Rel-17/Rel-18 SL communication are recommended for normative work.
  + For SL Positioning resource (pre-)configuration in a shared resource pool with Rel-16/17/18 sidelink communication, backward compatibility with legacy Rel-16/17 UEs should be ensured.
* Unicast, Groupcast (not including many to one) and Broadcast of SL-PRS transmission are recommended for normative work.

## RAN1 #112

**Agreement**

* A UE can be configured to perform either resource allocation Scheme 1 or Scheme 2, applicable to all resource pools (dedicated or shared resource pools).
* SL PRS unicast/groupcast/broadcast can occur in either a shared or a dedicated resource pool.

**Agreement**

For a dedicated resource pool for positioning:

* The set of slots that belong to a resource pool is determined in the same way as for legacy SL communication pool (i.e. see section 8 of 38.214).
  + FFS: additional slots that can be used for SL PRS is not precluded
* Study what the dedicated resource pools for positioning (pre-)configuration should include, and consider at least the following: The start PRB position, the number of contiguous PRBs, SL-PRS configuration, synchronization configuration, resource allocation scheme 2 related configuration, power control configuration, sub-channel size and sub-channel count, time-domain bitmap, reporting configuration

**Agreement**

For a dedicated resource pool for Positioning,

* With regards to which channels can be included in the resource pool in addition to SL-PRS, option 1 (No other channel can be included beyond SL-PRS) is NOT pursued further.
* Continue discussion between Option 2 and 3, and whether any other channel could also be included (e.g. PSFCH).

**Agreement**

Regarding Scheme 1 SL-PRS resource allocation, do not further consider a transmitting UE to receive the SL-PRS resource allocation through higher layers from the LMF (i.e. Option 1 is not pursued further).

**Agreement**

Sensing based or random selection in Scheme 2 is allowed by (pre-)configured per resource pool (similar to Rel-17 NR sidelink communication).

* + Working assumption: Sensing-based and random selection can be allowed in the same resource pool
  + FFS: whether any enhancements are needed for coexistence of random selection and sensing-based resource selection in a resource pool
* FFS: Details on the sensing-based resource selection and random selection, whether it will be similar to NR Rel-16 or NR Rel-17.

**Agreement**

With regards to random resource selection, reuse existing Rel-17 random selection mechanism from sidelink communications.

* + Study if any changes are needed

**Agreement**

In Scheme 2, with regards to the triggering of SL-PRS, support one or both of the following options:

* Option 1: Support SL-PRS transmission triggering at the physical layer by the UE’s own higher layers.
  + Note: this also includes higher layer triggering from another UE
* Option 2: Support UE-A to request UE-B to transmit SL-PRS via lower layer signaling sent by UE-A.
  + FFS: Whether lower-layer signaling is SCI or SL MAC-CE

**Agreement**

For SL-PRS transmission, at least support the following

* **SL-PRS transmissions with periodic reservation:** SL-PRS transmissions which are being reserved with a similar mechanism as the SL periodic resource reservation for another TB in legacy SL communication
  + FFS: whether/what changes are needed
* **SL-PRS transmissions without periodic reservation**: SL-PRS transmissions in which the SL-PRS is transmitted at least once without periodic reservation, with a similar mechanism as in legacy SL communication with SL resource without periodic reservation.
  + FFS: Maximum number of reservations and transmissions after triggering

**Agreement**

For the scheme 2 sensing-based resource allocation,

* Rel-16/17 resource (re)-selection procedure is reused for SL-PRS in the shared resource pool.
  + Study if/what changes are needed
* Rel-16[/17] resource (re)-selection procedure with periodic and without periodic reservations is the starting point for the design of SL-PRS in the dedicated resource pool.
  + Study what changes, if any, are needed at least with regards to the following: sensing window, resource selection window, reservation interval, Resource exclusion mechanism (e.g. definition of resource set for SL-PRS, how RSRP is measured, etc)
* From RAN1 perspective, priority value for SL PRS should be provided by higher layers from Tx UE perspective

## RAN1#112-bis

**Agreement**

For Scheme 1 SL-PRS resource allocation, a transmitting UE can receive a SL-PRS resource allocation signaling from gNB through a

* Dynamic grant
  + FFS Reuse DCI format 3\_0 for signalling SL-PRS resource allocation or Support a new DCI format (3\_X) and consider DCI format 3\_0 as a starting point
* Configured grant type 1
  + the SL-PRS transmission(s) follows the higher layer configuration
* Configured grant type 2
  + Support activating and releasing the configured grant using a new DCI format 3\_X or 3\_0 (to be down-selected between the two DCI formats)
* The above mechanisms use NR Rel-16 mode-1 signaling as a starting point
* FFS: whether same/different DCI format(s) are applied for shared pool and dedicated pool.
* FFS: Further details

**Agreement**

For a dedicated resource pool for positioning:

* No additional slots are needed to be supported

**Agreement**

For SL-PRS transmission, either dedicated resource pool(s) or shared resource pool(s) or both can be (pre-)configured in the only SL BWP of a carrier.

* A UE can be (pre-)configured with one or more dedicated SL resource pools.
* A UE can be (pre-)configured with one or more shared SL resource pools.

**Agreement**

Confirm the working assumption: Sensing-based and random selection can be allowed in the same resource pool.

* Note: It is possible to (pre-)configure a resource pool to exclusively use sensing-based resource allocation.

**Agreement**

For Scheme 2 SL-PRS resource allocation, specify congestion control mechanisms using the existing congestion control mechanisms as a starting point.

* Study at least the following aspects on potential changes over the existing congestion control mechanisms:
  + CBR and CR definition for SL-PRS
  + Which parameters  of a SL-PRS configuration could be impacted by the congestion control mechanism, the mapping between congestion measurements, SL-PRS priority and SL-PRS parameters
  + CR and CBR measurement time window
  + Congestion control processing time
  + Number of CBR ranges
  + Whether any proposed changes could be applicable to shared resource pools in addition to the dedicated resource pool

**Agreement**

With regards to the SCI signaling in a shared resource pool, in addition to SL PRS transmission, the UE transmits

* Opt. 1: SCI1-A & a 2nd stage SCI format are used for SL-PRS indication
  + FFS: Details including a new or existing 2nd stage SCI

**Agreement**

In a shared resource pool:

* SL-PRS, associated PSCCH and PSSCH scheduled by the PSCCH are included in the same slot
  + With regards to PSSCH and SL-PRS multiplexing, downselect one of the following alternatives in RAN1#113 meeting:
    - Alt. A.1: Only TDMing is supported
    - Alt. A.2: Only FDMing of PSSCH and SL-PRS is supported
      * FFS: Rate-matched around SL-PRS REs and/or PRB/sub-channel-level FDMing are supported potentially for different cases
      * Note: Rate-matched around SL-PRS REs is not applicable to comb-1 SL-PRS
    - Alt. A.3: Both Alt. A.1 and A.2 are supported in the specification
  + With regards to PSCCH and SL-PRS multiplexing, downselect one of the following alternatives in RAN1#113 meeting:
    - Alt. B.1: Only TDMing is supported
    - Alt. B.2: TDMing or PRB/sub-channel-based FDMing is supported
  + The PSSCH is used for (downselect one of the following alternatives in RAN1#113 meeting):
    - Alt. C.1: 2nd SCI only
    - Alt. C.2: 2nd SCI and SL-SCH
    - Alt. C.3: “2nd SCI only” or “2nd SCI and SL-SCH”
  + FFS: Handling of PT-RS and SL-PRS

**Agreement**

For a dedicated resource pool for SL positioning, only a single stage SCI is used. PSCCH and associated SL-PRS are TDMed in the same slot.

* FFS: whether SL-PRS can be transmitted in a slot without associated PSCCH

**Agreement**

For the scheme 2 sensing-based resource allocation:

* Alt. 2: Rel-16 resource (re)-selection procedure with periodic and without periodic reservations is the starting point for the design of SL-PRS in the dedicated resource pool.
  + Note: This means that Rel-17 partial sensing is not considered a starting point for the design

**Agreement**

For Scheme 2, in a dedicated resource pool, using Rel-16 resource (re)-selection procedure as the starting point, consider at least the following potential modifications:

* **Modification 1:** For the RS used to derive L1 SL-RSRP for resource exclusion:
  + Option 1: SL-PRS
  + Option 2: PSCCH DMRS
  + Option 3: PSSCH DMRS (if PSSCH is included in the dedicated resource pool)
* **Modification 2:** For the resource selection window:
  + Option 1: for the derivation of the window, using the legacy approach as a starting point, substitute the Packet Delay Budget (PDB) with a new delay budget
  + Option 2: the selection window is provided by higher layers
* **Modification 3:** For the SL-PRS priority:
  + Option 1: A single L1 SL-PRS priority is allowed in a resource pool
  + Option 2: Multiple L1 SL-PRS priority are allowed in a resource pool
* **Modification 4:** For the definition of a candidate resource within the resource selection window:
  + Options TBD
* **Modification 5:** For the reservation interval of SL-PRS:
  + Option 1: Provided by UE’s higher layers with values TBD. The set of values is (pre-)configured.
* **Modification 6:** For the sensing window length ():
  + Option 1: Use the legacy (pre-)configuration with values (100 msec, 1100 msec)
  + Option 2: Equal to or larger than the largest reservation interval
  + Option 3: Provided by higher layers with values TBD
* **Modification 7:** For the initial S-RSRP threshold & stepsize, target resource ratio X(%):
  + Options TBD
* **Modification 8:** For the pre-emption of the reserved resources:
  + Options TBD
* Note 1: Other potential modifications and/or other options within each modification are not precluded
* Note 2: Multiple options for each potential modification may be supported

**Agreement**

In Scheme 2, with regards to the triggering of SL-PRS,

* Support SL-PRS transmission triggering at the physical layer by the UE’s own higher layers
* Working assumption: Support UE-A to request UE-B to transmit SL-PRS via lower layer signaling sent by UE-A.
  + Up to UE-B’s own higher layers to transmit SL-PRS in response to the lower layer request from UE-A
  + FFS: Lower layer signaling corresponds to SCI, MAC-CE, or SL-PRS

## RAN1#113

**Agreement**

For a dedicated resource pool for SL positioning, SL-PRS cannot be transmitted in a slot without associated PSCCH.

**Agreement**

PSSCH is not included in dedicated resource pool for SL positioning.

**Agreement**

With regards to the SCI signaling in a shared resource pool,

* Support a new format for 2nd stage SCI.
  + FFS how to indicate the new 2nd stage SCI format
* FFS: If a 2nd stage SCI indicates both SL-PRS and SL-SCH, the cast type, destination ID, source ID are shared.

**Agreement**

In shared resource pools,

* With regards to PSCCH and SL-PRS multiplexing, support Alt. B.1. from previous agreement (i.e., Only TDMing is supported)

**Agreement**

In a shared resource pool, SL-PRS, associated PSCCH and PSSCH scheduled by the PSCCH are included in the same slot:

* With regards to PSSCH and SL-PRS multiplexing, only TDMing is supported for the already agreed comb sizes 1, 2, 4

**Agreement**

In a shared resource pool, SL-PRS, associated PSCCH and PSSCH scheduled by the PSCCH are included in the same slot:

* The PSSCH is used for 2nd SCI and SL-SCH
  + Note: the UE may not have data available for transmission. Up to RAN2 how to define the specification support for this case.

**Agreement**

For the shared resource pool, reuse the existing IUC signaling of both Scheme 1 and Scheme 2.

* SL-PRS transmissions are treated as any other legacy transmission for SL communication when considering IUC information exchanges.

**Conclusion**

For Rel-18 sidelink positioning:

* For the dedicated resource pool, IUC signalling is not supported
* Do not support that a UE can reserve a SL-PRS resource for the transmission of another UE

**Conclusion**

Do not support ACK/NACK feedback for SL-PRS or lower-layer feedback-based retransmissions in Release 18.

**Agreement**

PSFCH is not included in dedicated resource pool for SL positioning.

**Agreement**

In the dedicated resource pool,

* with regards to the SL-PRS time-domain resource allocation within the resource pool support a
  + SL-PRS-resource-based allocation
* SCI for SL-PRS should at least indicate the following values:
  + Source ID
  + Destination ID
  + Resource reservation period
  + SL-PRS Priority
  + Cast type
  + With regards to the SL-PRS configuration and/or SL-PRS time assignment information, select one alternative at RAN1#114:
    - Alt. 3.1: support a one-to-one mapping relationship between a PSCCH resource and an associated SL-PRS resource in the same slot.
      * Note: In this case, there is no need of an explicit signaling of which SL PRS resource for the same slot
      * Note: Same number of PSCCH resource(s) and SL-PRS resource(s)
    - Alt. 3.2: explicit signaling of SL PRS resource in the same slot
    - Alt. 3.3: support a mapping relationship between a PSCCH resource and one or more associated SL-PRS resource(s) in the same slot and explicit signaling of SL PRS resource
      * Only a one-to-one mapping is used between a PSCCH resource and an associated SL-PRS resource in the same slot if explicit signalling is not used
        + Note: with a one-to-one mapping, some SL-PRS resources might not be mapped
        + FFS: details, including (pre)configuration
    - FFS: Whether and how to indicate SCI resource(s) or SL-PRS resource (s) for a future slot
  + FFS: Additional information, e.g. SL-PRS request, Positioning Session ID, number of resource reservation periods

**Agreement**

* In Scheme 2, with regards to the triggering of SL-PRS, confirm the related WA for shared and dedicated resource pools.
* With regards to the lower-layer signalling, support SCI associated with SL-PRS transmission
  + FFS: whether this is enabled by (pre)configuration
* FFS: to support also SL-PRS

**Agreement**

For Scheme 2, in a dedicated resource pool,

* Multiple L1 SL-PRS priority are allowed in a resource pool
* A SL PRS resource within the resource selection window is used as a candidate resource
* with regards the reservation interval of SL-PRS, it is provided by UE’s higher layers with values TBD. The set of values is (pre-)configured.
  + Use the periodicities available for legacy SL communication and the ones defined for DL-PRS as a starting point.
* with regards to the resource (re)-selection procedure
  + support re-evaluation & pre-emption for SL-PRS using the Rel-16 re-evaluation and pre-emption respectively as a starting point.

**Agreement**

In dynamic grant type resource allocation in scheme 1,

* For shared resource pool, DCI format 3\_0 is being used as a starting point, down-select between the two alternatives below:
  + Alt. 1: Indication SL-PRS specific information is explicitly included in DCI
    - FFS: Which SL-PRS specific information
  + Alt. 2: Indication SL-PRS specific information is not explicitly included in DCI
* FFS: Dedicated resource pool

**Agreement**

In Scheme 2, congestion control can restrict the range of parameters for SL PRS configuration per resource pool by CBR and priority. Consider further the following parameter(s):

* Option 1: SL PRS transmission power
* Option 2: Periodicity of SL PRS
* Option 3: Number of occupied subchannels of SL-PRS (for shared resource pool)
* Option 4: Number of SL PRS resources in a slot
* Option 5: comb-size of a SL PRS resource in a slot
* Option 7: Number of OFDM symbols of a SL PRS resource in a slot
* Option 8: Number of SL PRS (re-)transmissions
* FFS: Other options are not precluded

**Agreement**

In a dedicated resource pool, with regards to the PSCCH, reuse the PSCCH channel structure of SL communications, at least with regards to the following aspects:

* The first PSCCH symbol is mapped to the 2nd symbol available for SL transmissions in a slot
  + Note: 1st symbol available for SL transmissions in a slot is for PSCCH AGC similar to legacy
* PSCCH DM-RS in the slot is being reused from legacy
* The number of PSCCH symbol(s) is (pre-)configured to (down-select at RAN1#114):
  + Alt. 1: 2 or 3 symbols (same as legacy)
  + Alt. 3: 1, or 2 or 3 symbols
* The number of PRBs is (pre-)configured using the legacy values
  + FFS: reconsider if 1-symbol PSCCH is supported

## RAN1#114

Agreement

For SL-PRS transmissions without periodic reservation, the maximum number of reservations signaled in an SCI is

* (pre-)configurable with a value of 2 or 3, which is similar with Rel-16 sidelink.

This is applicable to both shared and dedicated resource pool and both scheme 1 and scheme 2

Working assumption

In Scheme 2, with regards to the triggering of SL-PRS, for the SCI-based triggering, the SL-PRS request, in either SCI-1B or SCI-2D, is an explicit field

* If (pre-)configured per resource pool, then 1 bit is used, otherwise, it is 0 bits

Agreement

For dedicated resource pool, with regards to the SL-PRS configuration and/or SL-PRS time assignment information, support Alt. 3.1, i.e.

* support a one-to-one mapping relationship between a PSCCH resource and an associated SL-PRS resource in the same slot.
  + Note: In this case, there is no need of an explicit signaling of which SL PRS resource for the same slot
  + Note: Same number of PSCCH resource(s) and SL-PRS resource(s)

Agreement

For PSCCH configuration in a dedicated resource pool,

* (pre-)configure the number of PRBs of a PSCCH in the resource pool:
  + Alt. 1: One parameter for all PSCCHs

Agreement

For PSCCH configuration in a dedicated resource pool,

* The number of PSCCH symbol(s) is (pre-)configured to 2 or 3 symbols (same as legacy)

Agreement

In a shared resource pool, when PSSCH and SL-PRS are multiplexed in the same slot, they share the same source ID, destination ID, cast type fields.

Agreement

In a shared resource pool,

* To indicate the SCI format 2-D, the reserved state of the “2nd-stage SCI format” field (Codepoint “11”) in SCI format 1-A is used

Agreement

* For Scheme 2, in a dedicated resource pool, with regards to the sensing window length:
  + Use the legacy (pre-)configuration with values (100 msec, 1100 msec)
* For Scheme 2, in a dedicated resource pool, for the initial S-RSRP threshold & stepsize, target resource ratio X(%), reuse the legacy values from NR sidelink.

Agreement

For Scheme 2, in a dedicated resource pool, with regards to the resource (re)-selection procedure, the RS used to derive L1 SL-RSRP for resource exclusion is at least PSCCH DMRS.

* FFS: SL-PRS can be (pre)configured to derive L1 SL-RSRP for resource exclusion

Working assumption

In the shared resource pool, if SL PRS is multiplexed in slot, for the determination of a transmission of a TB, the UE shall determine the number of REs (NRE) within the slot as

where represents the number of OFDM symbols used for SL PRS in the slot.

The Tx UE should ensure the determined TB size unchanged across re-transmission(s) of the TB.

Agreement

In a shared resource pool,

* **Aspect 4:** In addition to the SL-PRS specific parameters, the following information related to PSSCH scheduling to indicate in the new second stage SCI 2-D, support at least the legacy content of SCI format 2-A and 2-B
  + FFS**:** to support the legacy content of SCI format 2-C

Working assumption

For Scheme 2, in a dedicated resource pool, using Rel-16 resource (re)-selection procedure as the starting point, support the following modification:

* **Modification 2:** For the resource selection window:
  + Option 1: for the derivation of the window, using the legacy approach as a starting point, substitute the Packet Delay Budget (PDB) with a Delay Budget for SL-PRS

Send an LS to RAN2 asking RAN2 whether they can confirm RAN1’s working assumption, and if not let RAN2 decide an alternative solution.

Agreement

Endorse the draft LS in R1-2308479 with the following modification to the action and adding SA2 in cc:

Change the Action Item as follows:

RAN1 respectfully asks RAN2 whether they can confirm RAN1’s working assumption, and if not, RAN1 requests RAN2 to decide an alternative solution and inform RAN1.

LS in [R1-2308651](file:///C:/Users/younsun/Documents/3GPP%20documents/RAN1%20tdocs/TSGR1_114/Docs/R1-2308651.zip) is endorsed.

Agreement

With regards to PSSCH and SL-PRS TDMed multiplexing, when determining the number of coded modulation symbols generated for 2nd-stage SCI transmission, symbols with SL-PRS are excluded when calculating ,

* Alt. 1: based on a value (pre-)configured in the resource pool for this purpose (new parameter).
  + FFS: possible values (to be decided when discussing RRC parameters)

Agreement

From RAN1 perspective, for scheme 1 SL-PRS resource allocation for a UE requiring to transmit SL-PRS, the serving gNB may receive a request for specific SL PRS resource characteristic(s)/SL-PRS resource configuration(s).

* Up to other WGs to decide on the appropriate signaling and details on SL PRS characteristic(s) and/or SL-PRS configuration(s) request

Agreement

In a shared resource pool, with regards to the fields in SCI format 2-D, include the following fields:

* SL PRS resource information indication of the current slot – ceiling(log2(#SL-PRS resources (pre-)configured in the resource pool) bits)
* SL PRS request – 0 or 1 bit
* Embedded SCI format – [X] bit(s)
  + If the “Embedded SCI format” field is set to [0], the SCI 2-A fields are included with necessary padding
  + If the “Embedded SCI format” field is set to [1], the SCI 2-B fields are included

Agreement

For the PSCCH configuration in a dedicated resource pool,

* A PSCCH is mapped in a single subchannel similar to shared resource pool and:
  + the resource pool is (pre-)configured with the size of a subchannel in PRBs and the number of subchannels, and follow the legacy PSCCH mapping to resources of NR SL.
    - FFS: whether to add additional values for the subchannel (pre-)configuration
  + the PSCCH in the ith subchannel is associated with the ith SL-PRS resource ID
  + Note: if the number of subchannels is larger than the (pre-)configured number of SL PRS resources, then subchannels with index larger than or equal to the (pre-)configured number of SL PRS resources are not mapped to any resource

Agreement

For Scheme 2 SL-PRS resource allocation, with regards to the congestion control for a dedicated RP, the following modifications are supported:

* **Modification 1:** For the definition of SL PRS CR and CBR:
  + Alt. 2: redefine CBR/CR by considering the SL-PRS resource allocation/configuration.

Agreement

For Scheme 2 SL-PRS resource allocation, with regards to the congestion control for a dedicated RP, the following modifications are supported:

* **Modification 2**: For the evaluation of RSSI used in the CBR definition:
  + SL-RSSI is measured on a slot configured for transmission of PSCCH and SL-PRS
  + A single SL-RSSI is measured on symbols with both SL-PRS and PSCCH

Agreement

For Scheme 2 SL-PRS resource allocation, with regards to the congestion control for a dedicated RP, the following modifications are supported:

* For the CR and CBR measurement time window size,
  + it can be separately configured for a dedicated resource pool and could take the legacy values

Agreement

In Scheme 2,

* For a dedicated resource pool for positioning,
  + congestion control can restrict at least the following range of parameters for SL PRS configuration per resource pool by CBR and priority:
    - Maximum SL PRS transmission power
    - Maximum Number of SL PRS (re-)transmissions
    - Discuss further the following four SL PRS transmission parameters:
      * Minimum Periodicity of SL PRS
      * Maximum Number of SL PRS resources in a slot
      * Maximum comb-size of a SL PRS resource in a slot
      * Maximum Number of OFDM symbols of a SL PRS resource in a slot
  + For congestion control similar to legacy, the CR limits are (pre)-configured per priority in a resource pool
    - Note: Similar to SL communication how to achieve the CR limit is left to UE implementation.
* For a shared resource pool for positioning, the SL PRS can share the same restriction of PSSCH without specific enhancement in addition to what is already specified.

Agreement

In the dedicated resource pool for positioning, with regards to the SCI for SL-PRS, information carried in SCI for SL-PRS should at least include:

* Field 1: SL-PRS priority - 3 bits
* Field 2: Source ID – Up to resource pool (pre-)configuration 12 or 24 bits
* Field 3: Destination ID - 24 bits
* Field 4: Cast type – 2 bits
* Field 5: Resource reservation period - Ceil(log2(Number of candidate values in (pre-)configuration))
  + Alt. 5.1: Up to 16 values
* Field 6: Time resource assignment for SL-PRS future reservations
  + 1 or 2 max future slots within 32 slots – 5 bits or 9 bits, based on the maximum number of the (pre-)configured future reservations
* Field 7: SL-PRS resource ID (s) for the future 1 or 2 reservations
  + Number of bits:
    - In case of max number of future reservations is (pre-)configured to 2: [2\*Ceil(log2(Number of SL-PRS resources in (pre-)configuration))]
    - In case of max number of future reservations is (pre-)configured to 1: Ceil(log2(Number of SL-PRS resources in (pre-)configuration))
* Field 8: SL-PRS request – 0 or 1 bit
* Field 9: Reserved bits – up to (pre-)configuration

Agreement

In Scheme 2, with regards to the congestion control for SL PRS:

* SL-PRS congestion processing time: based on both SCS and UE capability, similar to legacy
* The maximum number of CBR ranges for SL positioning is 8
* Number of CBR levels is 16
* CBR measurement for SL PRS can be reported to gNB

FFS: Whether it is needed to be reported to LMF or another UE

Agreement

For Scheme 2, in dedicated resource pools, with regards to the procedure for determining the subset of resources to be reported to higher layers, when triggering the resource (re-)selection procedure, the higher layers provide the following parameters for candidate SL-PRS transmission(s):

* resource pool from which to report SL-PRS resources
* Priority
* Delay budget
* Reservation period
* List of resources for pre-emption and re-evaluation
* Set of SL-PRS resource ID (s) which can include all (pre-)configured SL-PRS resource IDs

Agreement

For Scheme 2, in dedicated resource pools, with regards to the pre-emption,

* Pre-emption can be enabled/disabled by resource pool (pre)configuration using the same (pre-)configuration parameters as SL communications
* Reuse the legacy mechanism from SL communications with regards to SL-PRS priority-based comparison
  + The priority of SL-PRS to be transmitted is compared with the priority of SL-PRS reserved by other UEs.
* A resource for pre-emption checking is defined in terms of a sub-channel for PSCCH and the associated SL-PRS resource in a slot

Agreement

In resource allocation in scheme 1, for a dedicated resource pool

* in the DCI, introduce at least the following fields:
  + Resource pool index – number of bits same to SL communications
  + Time gap - 3 bits
  + SCI format 1-B fields:
    - Time resource assignment for SL-PRS future reservation(s)
    - SL-PRS resource ID (s) for the future 1 or 2 reservations
  + SL-PRS resource ID for the first SL-PRS transmission
  + Configuration index – number of bits same to SL communications
  + Padding bits, if required
* For configured grant type 1 resource allocation,
  + RRC is used for indicating at least the following:
    - Info-1: the periodicity,
    - Info-2: the slot offset relative to a logical slot defined by Info-3,
    - Info-3: SFN used for determination of the slot offset,
    - Info-4: Resource pool index
    - Info-5: Time resource assignment for SL-PRS future reservation(s)
    - Info-6: SL-PRS resource ID (s) for the future 1 or 2 reservations
    - Info-7: SL-PRS resource ID for the first SL-PRS transmission
* For configured grant type 2 resource allocation,
  + RRC is used for indicating at least the following:
    - Info 1: the periodicity
  + DCI is used for the activation/release of the configured grant resources

**Conclusion**

For Scheme 2 SL-PRS resource allocation, with regards to the congestion control for a shared RP, CBR and CR mechanisms from Rel.16 NR SL are reused.

* Add this agreement in the LS related to the priority handling

Agreement

Support the following for SL-PRS multiplexing/collision with the following channels:

* A SL-PRS resource and PSFCH (including the preceding gap symbol) are not mapped on the same symbols

Working assumption

The number of bits in the embedded SCI format field of SCI format 2-D is 2 bits

* If the “Embedded SCI format” field is set to 00, the SCI 2-A fields are included with necessary padding
* If the “Embedded SCI format” field is set to 01, the SCI 2-B fields are included
* If the “Embedded SCI format” field is set to 10, “size of SCI 2-B” number of reserved bits are included
* If the “Embedded SCI format” field is set to 11, “size of SCI 2-B” number of reserved bits are included
* Note: the size of SCI format 2-D is the same regardless of the value of the embedded SCI format field

**Conclusion**

In a shared resource pool, in the embedded SCI format of SCI format 2-D, there is no consensus to support the legacy content of SCI format 2-C.

**Conclusion**

For Scheme 2, in a dedicated resource pool, with regards to the resource (re)-selection procedure, there is no consensus to support to (pre-)configured SL-PRS to derive L1 SL-RSRP for resource exclusion.

## RAN1 #114-Bis

Agreement

In scheme 1, with regards to distinguishing between DCI format 3\_0 and 3\_2:

* New RNTIs, i.e., SL-PRS-RNTI & SL-PRS-CS-RNTI, are introduced.
* Support DCI size alignment between DCI format 3\_0, 3\_1 and 3\_2.

Agreement

Sidelink PRS Received Signal Strength Indicator (SL PRS-RSSI) is defined as the linear average of the total received power (in [W]) observed in:

* the SL-PRS resource and the associated PSCCH in OFDM symbols of slots configured for PSCCH and in OFDM symbols of slots configured for SL-PRS.
  + Introduce larger values for congestion control processing time capability than legacy SL

Agreement

The working assumption is confirmed with the following revision with regards to the number of padding bits:

* the padding bits, if any, are such that the size of the SCI format 2-D is the same as if the larger of SCI format 2-A or 2-B is embedded

|  |
| --- |
| Working assumption  The number of bits in the embedded SCI format field of SCI format 2-D is 2 bits   * If the “Embedded SCI format” field is set to 00, the SCI 2-A fields are included with necessary padding * If the “Embedded SCI format” field is set to 01, the SCI 2-B fields are included * If the “Embedded SCI format” field is set to 10, “size of SCI 2-B” number of reserved bits are included * If the “Embedded SCI format” field is set to 11, “size of SCI 2-B” number of reserved bits are included * Note: the size of SCI format 2-D is the same regardless of the value of the embedded SCI format field |

Agreement

In Scheme 2, with regards to the SCI-based triggering of SL-PRS, the following WA is confirmed:

|  |
| --- |
| Working assumption  In Scheme 2, with regards to the triggering of SL-PRS, for the SCI-based triggering, the SL-PRS request, in either SCI-1B or SCI-2D, is an explicit field   * If (pre-)configured per resource pool, then 1 bit is used, otherwise, it is 0 bits |

Agreement

* Regarding the following text in brackets in Section 8.4.4 of TS38.214:

|  |
| --- |
| [ If the *'[SL PRS request]'* field in the SCI associated with the received SL PRS is set to 1 then the UE shall report this request for SL PRS transmission to higher layers.] |

* Keep the text and remove the brackets with the change shown below:
  + '[SL PRS request]' field in the SCI associated with the received SL PRS is set to 1 then ~~the UE shall report~~ this request for SL PRS transmission is reported to higher layers.

**Conclusion**

In scheme 1, with regards to an explicit indication of SL-PRS specific information in DCI format 3\_0:

* Indication of SL-PRS specific information is not explicitly included in DCI

Agreement

With regards to the bitwidth of the field “Resource ID indication” when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 3:

* Ceil(2\*log2(Number of SL-PRS resources in (pre-)configuration)) bits should be used

Further discuss at TP for the above at RAN1#114bis.

**Conclusion**

In a dedicated resource pool, with regards to the PSCCH, do not introduce additional values for the subchannel (pre-)configuration.

Agreement

The following TP is endorsed for clause 16.4A of TS 38.213:

* Reason for change: to provide information regarding the starting PRB of PSCCH.
* Summary of change: include the information that the PSCCH starts from the lowest PRB of the sub-channel determined according to the index of the associated SL PRS resource
* The consequence if not approved is: the UE will not be able to determine which resource to use for PSCCH transmission

|  |
| --- |
| ---------------------------- Start of Text Proposal for TS 38.213 -----------------------------  < Unchanged parts are omitted >  **16.4A UE procedure for transmitting PSCCH in dedicated resource pool for SL PRS**  For a resource pool dedicated for SL PRS transmissions, a UE can be provided a number of symbols in the resource pool, by *sl-TimeResourcePSCCH*, starting from a second symbol that is available for SL transmissions in a slot, and a number of PRBs in the resource pool, by *sl-FreqResourcePSCCH*, starting from the lowest PRB of the sub-channel determined according to the index of the associated SL PRS resource for a PSCCH transmission with a SCI format 1-B.  A UE that transmits a PSCCH with SCI format 1-B using SL PRS resource allocation scheme 2 [6, TS 38.214] sets  < Unchanged parts are omitted >  ---------------------------- End of Text Proposal for TS 38.213 ----------------------------- |

Agreement

Confirm the working assumption related to the TB size determination from RAN1 #114, and endorse the following TP:

|  |  |
| --- | --- |
| ***Reason for change:*** | Corrections on TBS in a shared resource pool |
|  |  |
| ***Summary of change:*** | In clause 8.1.3.2 of TS 38.214, complement the value of under different conditions. |
|  |  |
| ***Consequences if not approved:*** | The TBS procedure in a shared resoruce pool is incomplete. |

|  |
| --- |
| ----------------------------------------- Start of text proposal to TS 38.214 v18.0.0-------------------------------------------  **8.1.3.2 Transport block size determination**  **<<< UNCHANGED PARTS OMITTED >>>**  The UE shall first determine the number of REs (*NRE*) within the slot.  - A UE first determines the number of REs allocated for PSSCH within a PRB () by , where  - is the number of subcarriers in a physical resource block,  - = *sl-LengthSymbols* -2, where *sl-LengthSymbols* is the number of sidelink symbols within the slot provided by higher layers,  - = 3 if '*PSFCH overhead indication'* field of SCI format 1-A indicates "1", and = 0 otherwise, if higher layer parameter *sl-PSFCH-Period* is 2 or 4. If higher layer parameter *sl-PSFCH-Period* is 0, . If higher layer parameter *sl-PSFCH-Period* is 1, .  - is the number of OFDM symbols used for SL PRS in the slot as indicated by the ‘*SL PRS resource ID*’ in SCI format 2-D if the 2nd-stage SCI is SCI format 2-D, and = 0 otherwise，  - is the overhead given by higher layer parameter *sl-X-Overhead*,  - is given by Table 8.1.3.2-1 according to higher layer parameter *sl-PSSCH-DMRS-TimePatternList.*  **<<< UNCHANGED PARTS OMITTED >>>**  ----------------------------------------- End of text proposal to TS 38.214 v18.0.0------------------------------------------- |

**Conclusion**

For a dedicated resource pool, no more discussion on potential restriction by SL PRS-CBR and priority for the following SL PRS transmission parameters:

* Maximum Number of SL PRS resources in a slot
* Maximum comb-size of a SL PRS resource in a slot
* Maximum Number of OFDM symbols of a SL PRS resource in a slot

Agreement

With regards to the dedicated resource pool for positioning, suggest to the editors to align the terminology used as:

* “Dedicated SL PRS resource pool” defined in 38.214 as shown below:
  + A sidelink resource pool which can be used for transmission of SL PRS and cannot be used for transmission of PSSCH will be referred to as dedicated SL PRS resource pool.

**Conclusion**

From RAN1 perspective, there is no need to introduce an association between a dedicated resource pool for positioning and a shared resource pool, or between a dedicated resource pool for positioning and a sidelink communication resource pool.

Agreement

* With regards to the SL PRS Channel Occupancy Ratio (SL PRS CR):
  + Sidelink PRS Channel Occupancy Ratio (SL PRS CR) evaluated at slot *n* is defined as the total number of SL PRS resources in the dedicated SL PRS resource pool used for its transmissions in slots [*n-a*, *n-1*] and granted in slots [*n*, *n+b*] divided by the total number of configured SL PRS resources in the transmission pool over [*n-a*, *n+b*].
* With regards to the SL PRS Channel Busy Ratio (SL PRS CBR):
  + SL PRS Channel Busy Ratio (SL PRS CBR) measured in slot n is defined as the number of SL PRS resources in the dedicated SL PRS resource pool whose SL PRS RSSI measured by the UE exceed a (pre-)configured threshold sensed over a SL PRS-CBR measurement window [n-a, n-1], wherein a is equal to 100 or 100·2µ slots, according to [sl-TimeWindowSizeCBR-positioning] divided by the total number of the configured sidelink PRS resources in the transmission pool over [n-a, n-1].

Working assumption

Endorse the following TP for clause 8.2.4.2 of TS 38.214:

|  |
| --- |
| ---------------------------- Start of Text Proposal for TS 38.214 -----------------------------  < Unchanged parts are omitted >  **8.2.4.2 UE procedure for determining slots and SL PRS resource(s) associated with an SCI format 1-B in a dedicated resource pool**  The set of slots and SL PRS resources for SL PRS transmission is determined by the PSCCH containing the associated SCI format 1-B, and fields '[*SL-PRS resource ID (s))*', '[*Time resource assignment]*' of the associated SCI format 1-B as described below.  The set of slots is determined as in clause 8.1.5, with the following modifications:  - "SCI format 1-A" is replaced by "SCI format 1-B",  - [ potential parameter name changes].  The first SL PRS resource is determined according to the sub-channel used for the PSCCH transmission containing the associated SCI format 1-B, where the index of the sub-channel in the resource pool is identical to the index of the SL PRS resource provided by [higher layer parameter].  The second SL-PRS and third SL PRS resource, if reserved by SCI format 1-B, are determined from " Resource ID indication" which is equal to a PRS Resource ID value (PRIV) where,  If [*sl-MaxNumPerReserve*] is 2 then    If [*sl-MaxNumPerReserve*]is3 then    where  - denotes the SL PRS resource ID for the second resource  - denotes the SL PRS resource ID for the third resource  - is the number of SL-PRS resources (pre-)configured in a slot of a resource pool.  ---------------------------- End of Text Proposal for TS 38.214 -----------------------------  < Unchanged parts are omitted > |

Agreement

For activation and deactivation of configured grant type 2 for SL PRS for DCI 3-2, use a dedicated field of size 1 bit.

Agreement

From RAN1 perspective, whether to support or not reporting of CBR measurements to LMF or another UE, is left up to other WGs.

Agreement

With regards to the shared resource pool for positioning, suggest to the editors to align the terminology used as:

* “shared SL PRS resource pool” defined in 38.214 as shown below:

A sidelink resource pool which can be used for transmission of both SL PRS and PSSCH will be referred to as shared SL PRS resource pool.

Agreement

Endorse the TP below for clause 8.5.2.3 of TS 38.214

|  |  |
| --- | --- |
| ***Reason for change:*** | Corrections on description associated with SCI format 2-D in a shared resource pool for the CSI reference resource definition |
|  |  |
| ***Summary of change:*** | In clause 8.5.2.3 of TS 38.214, SCI format 2-D is captured. |
|  |  |
| ***Consequences if not approved:*** | The description associated with SCI format 2-D in CSI reference resource definition is missing |

|  |
| --- |
| **8.5.2.3 CSI reference resource definition**  **<<< UNCHANGED PARTS OMITTED >>>**  If configured to report CQI index and RI index, in the CSI reference resource, the UE shall assume the following for the purpose of deriving the CQI index and RI index:  - The reference resource uses the CP length and subcarrier spacing configured for the SL BWP.  - Redundancy Version 0.  - PSCCH occupies 2 OFDM symbols.  - The number of PSSCH and DM-RS symbols is equal to *sl-LengthSymbols*‒2.  - Assume no REs allocated for sidelink CSI-RS.  - Assume no REs allocated SCI format 2-A, SCI format 2-B, ~~or~~ SCI format 2-C or SCI format 2-D.  **<<< UNCHANGED PARTS OMITTED >>>**  ----------------------------------------- End of text proposal to TS 38.214 v18.0.0------------------------------------------- |

Agreement

Step 5 for the resource selection procedure in Section 8.2.4.2 of 38.214 is modified as follows:

* In step 5, the second condition is modified as follows: for any periodicity value allowed by the higher layer parameter *sl-ResourceReservePeriodList* and any SL PRS resource ID in the set of SL PRS resource ID(s) provided by the higher layer, and a hypothetical SCI format 1-B received in slot with '*Resource reservation period*' field set to that periodicity value and indicating that SL-PRS resource ID, condition c in step 6 would be met.

Agreement

Confirm the following Working Assumption made in RAN1#114bis:

|  |  |
| --- | --- |
| Working assumption  Endorse the following TP for clause 8.2.4.2 of TS 38.214:   |  | | --- | | ---------------------------- Start of Text Proposal for TS 38.214 -----------------------------  < Unchanged parts are omitted >  **8.2.4.2 UE procedure for determining slots and SL PRS resource(s) associated with an SCI format 1-B in a dedicated resource pool**  The set of slots and SL PRS resources for SL PRS transmission is determined by the PSCCH containing the associated SCI format 1-B, and fields '[*SL-PRS resource ID (s))*', '[*Time resource assignment]*' of the associated SCI format 1-B as described below.  The set of slots is determined as in clause 8.1.5, with the following modifications:  - "SCI format 1-A" is replaced by "SCI format 1-B",  - [ potential parameter name changes].  The first SL PRS resource is determined according to the sub-channel used for the PSCCH transmission containing the associated SCI format 1-B, where the index of the sub-channel in the resource pool is identical to the index of the SL PRS resource provided by [higher layer parameter].  The second SL-PRS and third SL PRS resource, if reserved by SCI format 1-B, are determined from " Resource ID indication" which is equal to a PRS Resource ID value (PRIV) where,  If [*sl-MaxNumPerReserve*] is 2 then    If [*sl-MaxNumPerReserve*]is3 then    where  - denotes the SL PRS resource ID for the second resource  - denotes the SL PRS resource ID for the third resource  - is the number of SL-PRS resources (pre-)configured in a slot of a resource pool.  ---------------------------- End of Text Proposal for TS 38.214 -----------------------------  < Unchanged parts are omitted > | |

## RAN1 #115

Agreement

For DCI format 3-2, the resource pool index “I” should be an index over

* the number of dedicated SL PRS resource pools (pre-)configured to the UE

**Conclusion:**

For sidelink resource allocation scheme 1 (i.e. mode 1 in the specs), dynamic grant, configured grant type 1, and configured grant type 2 are supported for both dedicated and shared SL PRS resource pools.

Agreement

Support the following TP for 38.214 clause 8.2.4.1:

|  |
| --- |
| *In sidelink resource allocation mode 1:*  *- For SL PRS transmission, ~~a UE may be configured with~~ dynamic grant, configured grant type 1, and ~~[/]or~~ configured grant type 2 are supported* |

Agreement

* Use SL PRS delay budget instead of packet delay budget in SL PRS resource selection in a dedicated SL PRS resource pool in sidelink resource allocation mode 2.
  + Agree the below text proposal on Clause 8.2.4.2 of TS 38.214.

|  |
| --- |
| **Text Proposal 1**for TS 38.214 clause 8.2.4.2  <omitted text>  The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - “packet delay budget” is replaced by “SL PRS delay budget”  <omitted text> |

**Conclusion**

For a dedicated resource pool, the periodicity of SL PRS cannot be restricted by congestion control.

Agreement

The TP below is endorsed

|  |  |
| --- | --- |
| *Reason for change:* | Correction on step 6 of SL-PRS resource allocation |
|  |  |
| *Summary of change:* | In clause 8.2.4.2, add modification on step 6 regarding the SL-PRS resource and slot determination based on 8.2.4.2A. |
|  |  |
| *Consequences if not approved:* | The determination of resources applied for SL-PRS resource exclusion is not clear. |

|  |
| --- |
| \*\*\* Unchanged parts are omitted \*\*\*  8.2.4.2 UE procedure for determining the subset of resources to be reported to higher layers in SL PRS resource selection in a dedicated SL PRS resource pool in sidelink resource allocation mode 2  In resource allocation mode 2 in a dedicated SL PRS resource pool, the higher layer can request the UE to determine a subset of resources from which the higher layer will select resources for SL PRS/PSCCH transmission. To trigger this procedure, in slot *n,* the higher layer provides the following parameters for this SL PRS/PSCCH transmission:  \*\*\* Unchanged parts are omitted \*\*\*  The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - Partial sensing is not applicable in a dedicated SL PRS resource pool;  - A candidate single-slot resource for transmission is defined as the SL PRS resource with index within the Set of SL-PRS resource ID(s) provided by the higher layer and in slot  - "SCI format 1-A” is replaced by “SCI format 1-B",  - In step 5, the second condition is modified as follows: for any periodicity value allowed by the higher layer parameter *reservationPeriodAllowed-Dedicated-SL-PRS-RP* and any SL PRS resource ID in the set of SL PRS resource ID(s) provided by the higher layer, and a hypothetical SCI format 1-B received in slot with '*Resource reservation period*' field set to that periodicity value and indicating that SL-PRS resource ID, condition c in step 6 would be met.  - In condition c of step 6 “determines according to clause 8.1.5 the set of resource blocks and slots” is replaced by “determines according to clause 8.2.4.2A the set of SL PRS resources and slots”.  \*\*\* Unchanged parts are omitted \*\*\* |

Agreement

With regards to the UE SL PRS preparation procedure time, the TP below is endorsed

* Note to the editor of TS 38.214: it is up to the editor whether to create a new section or add this text to an existing section as appropriate

|  |
| --- |
| In sidelink resource allocation mode 1 for a dedicated SL PRS resource pool, the UE shall perform this procedure according to clause 8.6 (excluding the case of PSSCH for retransmission of a transport block), with the following modifications:  - "PSSCH for a transport block" is replaced by "SL PRS"  - "PSSCH" is replaced by "SL PRS" |

Agreement

The TPs below related to the description of SCI format 2-D are endorsed

* In clause 8.1.3/8.2.1/8.3/8.5.1.2/8.5.2.2/8.5.2.3 of TS 38.214, SCI format 2-D is captured as shown below:

|  |
| --- |
| -------------------------- Start of text proposal to TS 38.214 v18.0.0 with draft CR R1-2310764------------------------- 8.1.3 Modulation order, target code rate, redundancy version and transport block size determination The redundancy version is given by the "Redundancy version" field in SCI format 2-A, 2-B, ~~or~~ 2-C or 2-D.  **<<< UNCHANGED PARTS OMITTED >>>** 8.2.1 CSI-RS transmission procedure A UE transmits sidelink CSI-RS within a unicast PSSCH transmission if the following conditions hold:  - CSI reporting is enabled by higher layer parameter *sl-CSI-Acquisition*; and  - the '*CSI request*' field in the corresponding SCI format 2-A, ~~or~~ 2-C or 2-D is set to 1.  **<<< UNCHANGED PARTS OMITTED >>>** 8.3 UE procedure for receiving the physical sidelink shared channel For sidelink resource allocation mode 1, a UE upon detection of SCI format 1-A on PSCCH can decode PSSCH according to the detected SCI formats 2-A, 2-B, ~~and~~ 2-C and 2-D, and associated PSSCH resource configuration configured by higher layers. The UE is not required to decode more than one PSCCH at each PSCCH resource candidate.  For sidelink resource allocation mode 2, a UE upon detection of SCI format 1-A on PSCCH can decode PSSCH according to the detected SCI formats 2-A, 2-B, ~~and~~ 2-C and 2-D, and associated PSSCH resource configuration configured by higher layers. The UE is not required to decode more than one PSCCH at each PSCCH resource candidate.  A UE is required to decode neither the corresponding SCI formats 2-A, 2-B, ~~and~~ 2-C and 2-D nor the PSSCH associated with an SCI format 1-A if the SCI format 1-A indicates an MCS table that the UE does not support.  **<<< UNCHANGED PARTS OMITTED >>>** 8.5.1.2 Triggering of sidelink CSI reports The CSI-triggering UE is not allowed to trigger another aperiodic CSI report for the same UE before the last slot of the expected reception or completion of the ongoing aperiodic CSI report associated with the SCI format 2-A ,~~or~~ 2-C or 2-D with the '*CSI request*' field set to 1, where the last slot of the expected reception of the ongoing aperiodic CSI report is given by [10, TS38.321].  An aperiodic CSI report is triggered by an SCI format 2-A, ~~or~~ 2-C or 2-D with the '*CSI request*' field set to 1.  **<<< UNCHANGED PARTS OMITTED >>>** 8.5.2.2 Reference signal (CSI-RS) The UE can be configured with one CSI-RS pattern as indicated by the higher layer parameters *sl-CSI-RS-FreqAllocation, sl-CSI-RS-FirstSymbol* in *SL-CSI-RS-Config*.  Parameters for which the UE shall assume non-zero transmission power for CSI-RS are configured according to clause 8.2.1.  A UE is not expected to be configured such that a CSI-RS and the corresponding PSCCH can be mapped to the same resource element. A UE is not expected to receive sidelink CSI-RS and PSSCH DM-RS, nor CSI-RS and 2nd-stage SCI, on the same symbol.  Sidelink CSI-RS shall be transmitted according to [4, TS 38.211] in the resource blocks used for the PSSCH associated with the SCI format 2-A, ~~or~~ 2-C or 2-D triggering a report.  **<<< UNCHANGED PARTS OMITTED >>>**  -------------------------- End of text proposal to TS 38.214 v18.0.0 with draft CR R1-2310764------------------------- |

Agreement

The following TP for TS 38.214 Clause 8.1 is endorsed

|  |  |
| --- | --- |
| Reasons for change | The description of UE setting ‘Embedded SCI format’ field of SCI format 2-D is not correct. |
| Summary of change | Change the description of UE setting ‘Embedded SCI format’ field of SCI format 2-D. |
| Consequences if not approved | The specification is not aligned with the agreement. |
| Text proposal | The UE shall set the contents of the SCI format 2-D as follows:  - the UE shall set value of the *'[SL PRS resource ID]'* field as indicated by higher layers.  - the UE shall set value of the *'[SL PRS request]'* field as indicated by higher layers.  - the UE shall set value of the *'[Embedded SCI format]'* field as indicated by higher layers.  - if *'Embedded SCI format'* indicates that SCI format 2-A is embedded within this SCI format 2-D then the UE shall include in the *'[Embedded SCI format payload]'* field the fields of SCI format 2-A, set as specified above.  - if *'Embedded SCI format'* indicates that SCI format 2-B is embedded within this SCI format 2-D then the UE shall include in the *'[Embedded SCI format payload]'* field the fields of SCI format 2-B, set as specified above. |

**R1-2312472** Moderator Summary #1 on resource allocation for SL PRS Moderator (Qualcomm)

Conclusion

With regards to the SL PRS (re)transmission(s):

* RAN1 assumes that higher layers may provide to PHY layer more than one SL-PRS resource(s), which are used for the (re-)transmission of multiple SL-PRS(s) on different slots to the same target UE(s)
  + It is up to RAN2 to specify a mechanism for selection of multiple resources for SL-PRS

**Conclusion**

“Maximum Number of SL PRS (re-)transmissions” parameter is applicable to SL-PRS resource (re)-selection.

Agreement

Modify the description of current specification associated with definition of SL PRS-CBR and adopt TP #4 for TS38.215.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TP #4  |  |  | | --- | --- | | ***Reason for change:*** | The current definition on SL PRS-CBR in clause 5.1.49 misses the RRC parameter name for the SL PRS RSSI measurement threshold which is [*sl-ThreshS-PRS-RSSI-CBR*]. | |  |  | | ***Summary of change:*** | Add the RRC parameter name for the SL PRS RSSI measurement threshold. | |  |  | | ***Consequences if not approved:*** | Unclear which RRC parameter is referred by the current specification. |   -------------------------- Start of text proposal to TS 38.215 v18.0.0 with draft CR R1-2310743-------------------------  5.1.49 Sidelink PRS channel busy ratio (SL PRS-CBR)   |  |  | | --- | --- | | **Definition** | SL PRS Channel Busy Ratio (SL PRS-CBR) measured in slot *n* is defined as the number of SL PRS resources in the dedicated SL PRS resource pool whose SL PRS RSSI measured by the UE exceed a (pre-)configured threshold provided by the higher layer parameter [*sl-ThreshS-PRS-RSSI-CBR*] sensed over a SL PRS-CBR measurement window [*n*-*a*, *n*-1], wherein *a* is equal to 100 or 100·2µ slots, according to higher layer parameter [sl-TimeWindowSize-PRS-CBR-positioning] divided by the total number of the configured SL PRS resources in the transmission pool over [*n*-*a*,*n*-1].  The calculation of SL PRS-CBR is limited within the slots for which the SL PRS-RSSI is measured. If the number of SL PRS-RSSI measurement slots within the SL PRS-CBR measurement window is below a (pre-)configured threshold, a (pre-)configured SL PRS-CBR value is used. | | **Applicable for** | RRC\_IDLE intra-frequency,  RRC\_IDLE inter-frequency,  RRC\_INACTIVE intra-frequency,  RRC\_INACTIVE inter-frequency,  RRC\_CONNECTED intra-frequency,  RRC\_CONNECTED inter-frequency |   NOTE 1: The slot index is based on physical slot index.  *--- unchanged text omitted ---*  -------------------------- End of text proposal to TS 38.215 v18.0.0 with draft CR R1-2310743------------------------- |

**Conclusion**

For a dedicated SL-PRS resource pool, for comparing priority between SL-PRS and UL, support two threshold parameters, similar to legacy, which are used for comparing SL-PRS priority versus the threshold,

* if the priority value of SL-PRS is lower than the threshold, SL-PRS has higher priority;
* otherwise, UL has higher priority.

Note: No RAN1 specification change is expected from the above.

Agreement

The TP below is endorsed for TS38.214

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | ***Reason for change:*** | Corrections on description associated with resource allocation in a dedicated SL PRS resource pool. | |  |  | | ***Summary of change:*** | In clause 8.2.4.1.1 and 8.2.4.2 of TS 38.214, minimum resource allocation unit of SL PRS is captured. | |  |  | | ***Consequences if not approved:*** | The description associated with resource allocation in a dedicated SL PRS resource pool is inaccurate. |   -------------------------- Start of text proposal to TS 38.214 v18.0.0 with draft CR R1-2310764-------------------------  8.2.4.1.1 Resource allocation in time domain  The UE shall transmit the SL PRS in the same slot as the associated PSCCH.  For a dedicated SL PRS resource pool, the minimum resource allocation unit in the time domain is a SL PRS resource in a slot.  The UE shall transmit the SL PRS in consecutive symbols within the slot.  A UE does not transmit multiple SL PRS resources in the same slot.  **<<< UNCHANGED PARTS OMITTED >>>**  **8.2.4.2 UE procedure for determining the subset of resources to be reported to higher layers in SL PRS resource selection in a dedicated resource pool in sidelink resource allocation mode 2**  **<<< UNCHANGED PARTS OMITTED >>>**  The UE shall perform this procedure according to clause 8.1.4, with the following modifications:  - Partial sensing is not applicable in a dedicated SL PRS resource pool;  - ‘Candidate single-slot resource’ is replaced by ’candidate SL PRS resource’.  - A candidate ~~single~~ SL PRS resource for transmission is defined as the SL PRS resource with index within the Set of SL-PRS resource ID(s) provided by the higher layer and in slot  - "SCI format 1-A” is replaced by “SCI format 1-B",  - In step 5, the second condition is modified as follows: for any periodicity value allowed by the higher layer parameter *reservationPeriodAllowed-Dedicated-SL-PRS-RP* and any SL PRS resource ID in the set of SL PRS resource ID(s) provided by the higher layer, and a hypothetical SCI format 1-B received in slot with '*Resource reservation period*' field set to that periodicity value and indicating that SL-PRS resource ID, condition c in step 6 would be met.  - In condition b of step 6, the RSRP measurement is the PSCCH-RSRP over the DM-RS resource elements of the PSSCH;  - In condition c of step 6 "determines according to clause 8.1.5 the set of resource blocks and slots" is replaced by "determines according to clause 8.2.4.2A the set of slots and SL PRS resources".  **<<< UNCHANGED PARTS OMITTED >>>**  -------------------------- End of text proposal to TS 38.214 v18.0.0 with draft CR R1-2310764------------------------- |

Agreement

Send an LS to RAN2 and RAN3 with the following:

* From RAN1 perspective, for scheme 1, it is important for the following request to be specified:
  + a gNB is able to receive a request from either LMF or UE for SL-PRS bandwidth
* Action to RAN2 and RAN3 to consider how to specify support for such request, if not already specified.

**R1-2312629** Draft LS on the request for specific SL PRS resource characteristic(s)/SL-PRS resource configuration Qualcomm Incorporated

R1-2312630 LS on the request for specific SL PRS resource characteristic(s)/SL-PRS resource configuration RAN1, Qualcomm Incorporated

Agreement

The draft LS in R1-2312629 is endorsed, with clarification that it goes to RAN WG2 and RAN WG3. Final LS is agreed in R1-2312630.

Agreement

The total number of SL configured grants (including both Type1 and Type2) at a UE across all resource pools is not larger than 8.

Agreement

For support of IUC in shared SL PRS resource pool, value 1 of parameter *sl-TriggerConditionRequest* means the explicit request can be triggered only when UE-B has data *or SL PRS* to be transmitted to UE-A.

* Including this into the higher parameter list.

## RAN1 #116

**Conclusion**

Indication of whether same antenna port may be assumed for SL PRS and PSSCH to enable joint processing at UE receiver is not supported in Rel-18.

Agreement

Agree on TP#1 in section 6 of R1-2401547 for Subclause 8.4.1.6.3 of TS 38.211 to capture the transmit power for the AGC symbol associated with SL PRS resource in a dedicated SL PRS resource pool.

|  |  |
| --- | --- |
| Reason for change | The transmit power of the OFDM symbol immediately preceding a SL PRS resource should be same as that for the SL PRS resource. However, this may not be clear from the current specification. |
| Summary of change | Subclause 8.4.1.6.3 of TS 38.211:  Add the description to ensure the power of the OFDM symbol immediately preceding the SL PRS resource and the SL PRS resource are the same. |
| Consequences if not approved | Incorrect description for the bandwidth of SL PRS in a dedicated SL PRS resource pool. |
| Text proposal | **------------------------------ TP#1: TS 38.211 -----------------------------------**  **8.4.1.6.3 Mapping to physical resources**  **< Unchanged text omitted >**  For transmission of an SL PRS in a dedicated SL PRS resource pool, the content of the OFDM symbol immediately preceding the SL PRS resource shall be generated based on 8.4.1.6.2 and mapped to resource elements with  - the time-domain index  - the set of frequency-domain indices shall be identical to those of the last OFDM symbol in the SL PRS resource  - the amplitude scaling factor shall be same as the amplitude scaling factor of the SL PRS resource.  **< Unchanged text omitted >** |

Agreement

Agree on TP#3 in section 6 of R1-2401547 for Subclause 8.2.4.1.2 of TS 38.214 to reflect that the bandwidth of SL PRS in a dedicated SL PRS resource pool is same as the resource pool bandwidth in number of RBs of the same resource pool.

|  |  |
| --- | --- |
| Reason for change | Current description lacks clarity as to the number of RBs given by sl-RB-Number of which resource pool is referenced in determining the bandwidth of a SL PRS resource in a dedicated SL PRS resource pool. |
| Summary of change | Clause Subclause 8.2.4.1.2 of TS 38.214:  Clarify that the bandwidth of SL PRS in a dedicated SL PRS resource pool is same as that of the bandwidth of the resource pool indicated via the higher layer parameter *sl-RB-Number* of the corresponding dedicated SL PRS resource pool by changing “a” to “the”. |
| Consequences if not approved | Ambiguous description for the bandwidth of SL PRS in a dedicated SL PRS resource pool. |
| Text proposal | **------------------------------ TP#3: TS 38.214 -----------------------------------**  **< Unchanged text omitted >**  8.2.4.1.2 Resource allocation in frequency domain  For a shared SL PRS resource pool, the frequency domain resource assignment of a SL PRS resource is the same as PSSCH in the same slot.  For a dedicated SL PRS resource pool, the frequency domain resource assignment of a SL PRS resource is same as frequency resources of the resource pool provided by the higher layer parameter *sl-RB-Number*.  **< Unchanged text omitted >** |

Agreement

Agree on TP#4 in section 6 of R1-2401547 for Subclause 16.2.3A of TS 38.213 to correct the reference to higher layer parameter for controlling the maximum transmission power for SL PRS in a dedicated SL PRS resource pool and for alignment of higher layer parameter names.

|  |  |
| --- | --- |
| Reason for change | Currently, in TS 38.213, both SL PRS transmission power for dedicated resource pool and for shared resource pool are related to the parameter “sl-MaxTxPower”. However, “sl-MaxTxPower” can only be used in shared SL PRS resource pool. According to RAN1’s agreement and TS 38.331, for a dedicated SL PRS resource pool, congestion control can restrict the maximum of SL PRS transmission power “sl-PRS-MaxTx-power” per pool by CBR and priority. |
| Summary of change | Clause Subclause 16.2.3A of TS 38.213:  (1) Introduce two separate bullets for determining P\_(MAX,CBR) for SL PRS transmission power in shared SL PRS resource pool and dedicated SL PRS resource pool respectively and add reference to *sl-PRS-MaxTx-power*.  (2) Align parameter name with TS 38.331 for *dl-P0-SL-PRS*, *dl-Alpha-SL-PRS*, *sl-P0-SL-PRS*, *sl-Alpha-SL-PRS*. |
| Consequences if not approved | Specifications not aligned with RAN1 agreement or TS 38.331. |
| Text proposal | **------------------------------ TP#4: TS 38.213 -----------------------------------**  **< Unchanged text omitted >**  **16.2.3A SL PRS**  A UE determines a power for a SL PRS transmission on a resource pool in SL PRS transmission occasion on active SL BWP of carrier as:  where,  - is defined in [8-1, TS 38.101-1]  -  - if the resource pool is a shared SL PRS resource pool, is determined by a value of *sl-MaxTxPower* based on a priority level and a CBR range for a CBR measured in slot , where is the congestion control processing time [6, TS 38.214]; if *sl-MaxTxPower* is not provided, then . The priority level is same for PSSCH and SL PRS  - if the resource pool is a dedicated SL PRS resource pool, is determined by a value of *sl-PRS-MaxTx-Power* based on a priority level and a CBR range for a CBR measured in slot , where is the congestion control processing time [6, TS 38.214]; if *sl-PRS-MaxTx-Power* is not provided, then . The priority level is for SL PRS  - if a value for is provided  - [dBm]  - else  - [dBm]  where  - if the resource pool is a shared SL PRS resource pool, is a value of *dl-P0-PSSCH-PSCCH* or *dl-P0-PSSCH-PSCCH-r17*; else, if the resource pool is a dedicated SL PRS resource pool, is a value of *dl-P0-SL-PRS*  - if the resource pool is a shared SL PRS resource pool, is a value of *dl-Alpha-PSSCH-PSCCH*, if provided, and if *dl-Alpha-PSSCH-PSCCH* is not provided; else, if the resource pool is a dedicated SL PRS resource pool, is provided by *dl-Alpha-SL-PRS*, if provided, and if *dl-Alpha-SL-PRS* is not provided  - when the active SL BWP is on a serving cell , as described in clause 7.1.1 except that  - the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - is a number of resource blocks for the SL PRS transmission occasion and is a SCS configuration for the SL PRS transmission  - if a value for is provided  - [dBm]  - else  - [dBm]  where  - if the resource pool is a shared SL PRS resource pool, is a value of *sl-P0-PSSCH-PSCCH* or *sl-P0-PSSCH-PSCCH-r17*; else, if the resource pool is dedicated for SL PRS transmissions, is a value of *sl-P0-SL-PRS*  - if the resource pool is a shared SL PRS resource pool, is a value of *sl-Alpha-PSSCH-PSCCH*, if provided and if *sl-Alpha-PSSCH-PSCCH* is not provided; else, if the resource pool is a dedicated SL PRS resource pool, is provided by *sl-Alpha-SL-PRS* if provided, and if *sl-Alpha-SL-PRS* is not provided  **< Unchanged text omitted >** |

Agreement

* For SL PRS transmission, the higher layer parameter *sl-FilterCoefficient* is provided on a per resource pool basis.
* Inform RAN2 to add *sl-FilterCoefficient* to *SL-PRS-ResourcePool*.

Agreement

TP#6 in Section 8 of R1-2401548 for Subclause 8.2.4 of TS 38.214 is endorsed to improve clarity of the specifications and align with higher layer parameter names for description of SL PRS resource.

Agreement

Endorse the TP 3.1-1 in section 8.1 of R1-2401611 for TS 38.214 clause 8.4.4.

|  |  |
| --- | --- |
| Reason for change | The current spec does not capture the anchor UE behaviour if the synchronization source is gNB or eNB. |
| Summary of change | Add corresponding description in TS 38.214 Clause 8.4.4. |
| Consequences if not approved | The specification is not complete. |
| Text proposal | **-------------------------------------- TS 38.214 -----------------------------------------------------**8.4.4 SL PRS reception procedure < Unchanged text omitted >  The UE may report synchronization source type via [*sync-Info-for-SL-TDOA-TOA*] and/or relative time difference with the associated quality metric, via [*higher layer parameter(s)*]. If reported *syncSourceType* is *gNB-eNB*, the UE may report cell identity information. For the SL RSTD measurement, the UE may report a reference UE information.  < Unchanged text omitted > |

Agreement

Endorse the TP 3.2-1 in section 8.1 of R1-2401611 for TS 38.214 clause 8.4.4.

|  |  |
| --- | --- |
| Reason for change | The current spec does not capture the UE may be provided with synchronization source type of a UE and/or the relative time difference with the associated quality metric. |
| Summary of change | Add corresponding description in TS 38.214 Clause 8.4.4. |
| Consequences if not approved | The specification is not complete. |
| Text proposal | **-------------------------------------- TS 38.214 -----------------------------------------------------**8.4.4 SL PRS reception procedure < Unchanged text omitted >  The UE may report synchronization source type via [*sync-Info-for-SL-TDOA-TOA*] and/or relative time difference with the associated quality metric, via [*higher layer parameter(s)*]. For UE-based positioning, the UE may be provided with synchronization source type of a UE and/or the relative time difference with the associated quality metric, via [*higher layer parameter(s)*]. For the SL RSTD measurement, the UE may report a reference UE information.  < Unchanged text omitted > |

Agreement

Endorse the TP 5.1-1 in section 8.1 of R1-23401611 for TS 38.214 clause 8.4.4.

Agreement

Feature Lead Proposal 8-v0 in section 6 of R1-2401608 is agreed with the corresponding TP for 38.214.

|  |  |
| --- | --- |
| ***Reason for change:*** | In dedicated SL PRS resource pool, RSRP measurement is the PSCCH-RSRP over the DM-RS resource elements of the PSCCH. |
|  |  |
| ***Summary of change:*** | Correct PSCCH-RSRP over the DM-RS resource elements of the PSCCH, not PSSCH. |
|  |  |
| ***Consequences if not approved:*** | Incorrect RSRP measurement in dedicated SL PRS resource pool. |
|  |  |
| ***Clauses affected:*** | 8.2.4.2 in TS 38.214. |
|  |  |

**---------------------------------------< Text Proposal 1 for 38.214> --------------------------------------**

8.2.4.2 UE procedure for determining the subset of resources to be reported to higher layers in SL PRS resource selection in a dedicated SL PRS resource pool in sidelink resource allocation mode 2

*…*

The UE shall perform this procedure according to clause 8.1.4, with the following modifications:

- "packet delay budget" is replaced by "SL PRS delay budget",

- partial sensing is not applicable in a dedicated SL PRS resource pool,

- "candidate single-slot resource" is replaced by "candidate SL PRS resource",

- a candidate single-slot resource for transmission is defined as the SL PRS resource with index within the Set of SL-PRS resource ID(s) provided by the higher layer and in slot ,

- "SCI format 1-A" is replaced by "SCI format 1-B",

- in step 5, the second condition is modified as follows: for any periodicity value allowed by the higher layer parameter *reservationPeriodAllowed-Dedicated-SL-PRS-RP* and any SL PRS resource ID in the set of SL PRS resource ID(s) provided by the higher layer, and a hypothetical SCI format 1-B received in slot with '*Resource reservation period*' field set to that periodicity value and indicating that SL-PRS resource ID, condition c in step 6 would be met,

- In condition b of step 6, the RSRP measurement is the PSCCH-RSRP over the DM-RS resource elements of the PSCCH;

- In condition c of step 6 "determines according to clause 8.1.5 the set of resource blocks and slots" is replaced by "determines according to clause 8.2.4.2A the set of SL PRS resources and slots ".

**-------------------------------------------**< End of Text Proposal 1> **---------------------------------------**

Agreement

Feature Lead Proposal 6-v0 in section 6 of R1-2401608 is agreed with the corresponding TP for 38.213.

Agreement

Feature Lead Proposal 10-v0 in section 6 of R1-2401608 is agreed with the corresponding TP for 38.214.

Agreement

Send an LS to RAN2 to inform them of the parameter ***sl-ThreshS-RSSI-PRS-CBR*** that needs to be introduced in TS 38.331 and is currently missing from the list of higher layer parameters in R1-2312708:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub-feature group** | **RAN1 specification** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** |
| SL PRS configuration in a dedicated resource pool | 38.215 | *sl-ThreshS- RSSI-PRS-CBR* | New | Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the SL PRS-CBR measurement in a dedicated SL PRS resource pool. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to (-112 + n\*2) dBm, and so on. | INTEGER (0..45) | Per dedicated SL PRS resource pool | Yes | 38.331 |

Agreement

The draft LS in R1-2401826 is endorsed. Final LS in R1-2401827.

**Conclusion**

1-symbol PSCCH is not supported for Rel-18.

Agreement

Feature Lead Proposal 9-v0 in section 6 of R1-2401608 is agreed with the corresponding TP for 38.212.

Agreement

Feature Lead Proposal 13.4-v0 in section 6 of R1-2401608 is agreed with the corresponding TP for 38.215.

Agreement

Feature Lead Proposal 13.1-v0 in section 6 of R1-2401608 is agreed with the corresponding TP for 38.212.

Agreement

Text Proposal 1 for TS38.214 in section 16 of R1-2401792 is endorsed for the editor’s alignment CR.

Agreement

Text Proposal 2 for TS38.213 in section 16 of R1-2401792 is endorsed for the editor’s alignment CR.

Agreement

The TP below is endorsed for TS38.202.

|  |  |
| --- | --- |
| Reason for change | For the characterization of simultaneous “Reception Type” combinations for sidelink, further qualification would be necessary to describe the scope within which the numbers of simultaneous “Reception Type” combinations apply for SL PRS reception. In particular,   * For a shared SL PRS resource pool, the number of simultaneous SL PRS receptions should be defined within one sub-channel to align with SL communications (*cf.* Note 1 applicable for PSSCH and PSCCH). * For a dedicated SL PRS resource pool, the number of simultaneous SL PRS receptions should be defined within a dedicated SL PRS resource pool (analogous to a sub-channel for SL communications). |
| Summary of change | Clarify notes Note 3 and 4 in Table 6.3-4 |
| Consequences if not approved | Incomplete/ambiguous specifications: It is unclear as to the time-frequency region within which the maximum numbers of simultaneous receptions of SL PRS for a shared and dedicated SL PRS resource pool is defined. |

**< Unchanged text omitted >**

**Table 6.3-4: Sidelink "Reception Type" combinations**

|  |  |
| --- | --- |
| **Supported Combinations** | **Comment** |
| A |  |
| B | Note 1, Note 2 |
| C | Note 1, Note 2 |
| E | Note 3 |
| E | Note 4 |
| D | Note 2 |
| B+C | Note 1, Note 2 |
| Note 1: Corresponds to simultaneous reception within one sub-channel  Note 2: Depending on the UE capability, the UE may be able to perform simultaneous sidelink communication receptions of the same sidelink “Reception Type” combinations across multiple SL carriers.  Note 3: Applicable for a shared SL PRS resource pool. Corresponds to simultaneous reception within one sub-channel.  Note 4: Applicable for a dedicated SL PRS resource pool with M1≥1. Corresponds to simultaneous reception within one dedicated SL PRS resource pool. | |

**< Unchanged text omitted >**

Working assumption

* In NR Rel-18, in a band (pre)configured with SL CA, SL PRS transmission /reception can be supported:
* In a shared SL PRS resource pool in a single SL carrier.
  + Tx power control follows the rule defined for SL CA in NR Rel-18
* In a dedicated SL PRS resource pool in a single SL carrier when the slots (pre)configured for the dedicated SL PRS resource pool do not collide with the slots (pre)configured for any other resource pool or S-SSB resource(s) in other carriers.
* FFS: new UE capability(ies) are defined for this combination of features
* Note: whether this combination of features is supported in Rel-18 requires a conclusion on whether to introduce new UE capability(ies). No specification work until the FFS is resolved.

Agreement

To the following question from RAN2 in R1-2400008, RAN1 to respond as below:

* + Question from RAN2:
    - On the maximum number of parallel SL-PRS transmission
      * What is the maximum total number of parallel SL-PRS transmission on SL-PRS shared/dedicated resource pool?
  + RAN1’s response: While the interpretation intended by RAN2 for “parallel SL PRS transmission” is not fully clear, RAN1 understands that it is referring to the number of processes similar to the number of SL processes associated with a SL HARQ entity for SL communications. There is no concept of parallel SL PRS transmission processes defined/used in RAN1 and such a concept is expected to be transparent to RAN1 specifications. Accordingly, the maximum total number of parallel SL PRS transmission in a shared/dedicated SL PRS resource pool can be up to RAN2.

Agreement

To the following question from RAN2 in R1-2400008, RAN1 to respond as below:

* + Question from RAN2:
    - On the maximum number of parallel SL-PRS transmission
      * What is the maximum number of parallel SL-PRS transmission supported on a SL-PRS shared resource pool and SL-PRS dedicated resource pool, respectively?
  + RAN1’s response: Following from the response to the first question, the maximum number of parallel SL PRS transmission in a shared/dedicated SL PRS resource pool respectively can be up to RAN2.

Agreement

To the following question from RAN2 in R1-2400008, RAN1 to respond as below:

* + Question from RAN2:
    - When SL-PRS is transmitted on a SL-PRS shared resource pool where PSFCH is configured, if the associated PSSCH transmission is positively acknowledged, should the UE continue to perform SL-PRS retransmission?
  + RAN1’s response: Since there is no notion of Layer 1 feedback in response to SL PRS transmission, a positive acknowledgement for an associated PSSCH may not be interpreted to indicate successful reception of SL PRS (see RAN1 conclusion from RAN1 #113 below). Accordingly, a Tx UE may continue to perform SL PRS retransmissions if it has been provided with multiple resources for (re-)transmission by the MAC layer, subject to any restrictions on the maximum number of retransmissions.

|  |
| --- |
| **Conclusion**  Do not support ACK/NACK feedback for SL-PRS or lower-layer feedback-based retransmissions in Release 18. |

Agreement

The draft LS in R1-2401551 is endorsed (with the addition of the missing conclusion). Final LS in R1-2401552.

## RAN1 #116-bis

Agreement

Agree on TP#2 in Section 4 of R1-2403465 for Subclause 16.2.3A of TS 38.213 to align parameter name for power control parameter for SL PRS.

Agreement

Agree on TP#4 in Section 4 of R1-2403465 for TS 38.211, Clauses 8.2.1 and 8.4.1.6.3 to correct description associated with AGC symbol associated with SL PRS transmission in dedicated SL PRS resource pool.

Agreement

Agree on TP#5 in Section 4 of R1-2403465 for TR 38.859, Table A.1-3 to correct incorrect evaluation assumptions for highway and urban grid scenarios for V2X use-case.

Agreement

Final CR for TR 38.859 is agreed in R1-2403620.

Agreement

Agree on TP#6A in Section 4 of R1-2403465 for Clause 8.2.4 of TS 38.214 to remove duplication of statement in TS 38.214 regarding SL PRS and associated PSCCH being in the same slot.

Agreement

* For a band configured with SL CA, confirm the related working assumption from RAN1 #116 with the introduction of the following new UE capabilities:
  + One UE capability for SL PRS transmission for a band configured with SL CA
  + One UE capability for SL PRS reception for a band configured with SL CA
  + Note: there will not be two separate FG components for shared RP and dedicated RP

Agreement

The TP below for 38.214 Section 8.2.4.3 is endorsed

|  |
| --- |
| * Reason for change: the new processing timing capability 3 is introduced for SL-PRS Congestion control. * Summary of change: Capture the new processing timing capability 3 for SL-PRS Congestion control * Consequences if not approved: the new processing timing capability 3 is missing in the specification. |
| 8.2.4.3 Sidelink congestion control in a dedicated SL PRS resource pool in sidelink resource allocation mode 2 When transmitting SL-PRS in a dedicated SL PRS resource pool the UE shall perform sidelink congestion control as specified in clause 8.1.6, with the following modification(s):  - "PSSCH" is replaced by "SL PRS"  - [potential parameter name changes]  - the congestion control processing time *N* is based on µ of Table 8.1.6-1, Table 8.1.6-2 and Table 8.2.4.3-1 for UE processing capability 1, 2 and 3 respectively, where µ corresponds to the subcarrier spacing with which the SL PRS is to be transmitted. A UE shall only apply a single processing time capability in SL-PRS congestion control in dedicated SL PRS resource pool.  Table 8.2.4.3-1: Congestion control processing time for processing timing capability 3   |  |  | | --- | --- | | **µ** | Congestion control processing time N [slots] | | 0 | 3 | | 1 | 6 | | 2 | 12 | | 3 | 24 | |

Agreement

Send LS to RAN2 for the feature of UE reporting SL PRS CBR measurement to gNB:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub-feature group** | **RAN1 specification** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** |
| Measured result for NR sidelink |  | *measResultListCBR-Dedicated-SL-PRS-NR* | New | Indicates the list of SL PRS CBR measurement results for NR sidelink positioning for dedicated SL PRS resource pool | SEQUENCE (SIZE (1.. maximum number of dedicated SL PRS resource pool to measure)) OF measResultCBR-Dedicated-SL-PRS-NR | Per UE | / | 38.331 |
| Measured result for NR sidelink |  | *measResultCBR-Dedicated-SL-PRS-NR* | New | Indicates the SL PRS CBR measurement results for NR sidelink positioning for dedicated SL PRS resource pool | SL-CBR-Dedicated-SL-PRS-RP (0 … 100) and SL-PRS-ResourcePoolID | Per UE | / | 38.331 |

**R1-2403576** Draft LS on UE’s reporting SL PRS CBR measurement to gNB Qualcomm Incorporated

Agreement

The draft LS in R1-2403576 is endorsed. Final LS in R1-2403577.

Agreement

The TP below for TS 38.214 Section 8.3 is endorsed:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | ***Reason for change:*** | In case that SCI format 1-A indicates an MCS table that the UE does not support, a UE may still require to decode corresponding SCI format 2-D. | |  |  | | ***Summary of change:*** | In case that SCI format 1-A indicates an MCS table that the UE does not support, a UE is required to decode neither the corresponding SCI formats 2-A, 2-B, 2-C nor corresponding SCI format 2-D. | |  |  | | ***Consequences if not approved:*** | Meaningless decoding of SCI format 2-D | |  |  | | ***Clauses affected:*** | 8.3 in TS 38.214 | |  |  |   **---------------------------------------< Text Proposal #7 for 38.214> --------------------------------------**  8.3 UE procedure for receiving the physical sidelink shared channel  For sidelink resource allocation mode 1, a UE upon detection of SCI format 1-A on PSCCH can decode PSSCH according to the detected SCI formats 2-A, 2-B, 2-C and 2-D, and associated PSSCH resource configuration configured by higher layers. The UE is not required to decode more than one PSCCH at each PSCCH resource candidate.  For sidelink resource allocation mode 2, a UE upon detection of SCI format 1-A on PSCCH can decode PSSCH according to the detected SCI formats 2-A, 2-B, 2-C and 2-D, and associated PSSCH resource configuration configured by higher layers. The UE is not required to decode more than one PSCCH at each PSCCH resource candidate.  A UE is required to decode neither the corresponding SCI formats 2-A, 2-B, 2-C, 2-D nor the PSSCH associated with an SCI format 1-A if the SCI format 1-A indicates an MCS table that the UE does not support.  **-----------------------------------**< End of Text Proposal **#7** for 38.214> **-------------------------------** |

Agreement

The TP below for TS 38.214 Section 8.1 is endorsed.

|  |
| --- |
| -------------------------- Start of text proposal #13.2 to TS 38.214 v18.2.0 -----------------------------  8.1 UE procedure for transmitting the physical sidelink shared channel  **<<< UNCHANGED PARTS OMITTED >>>**  The UE shall set the contents of the SCI format 2-D as follows:  - the UE shall set value of the *'SL PRS resource ID'* field as indicated by higher layers.  - the UE shall set value of the *'SL PRS request'* field as indicated by higher layers.  - the UE shall set value of the *'Embedded SCI format'* field as indicated by higher layers.  - if *'Embedded SCI format'* indicates that SCI format 2-A is embedded within this SCI format 2-D then the UE shall include in the *'Embedded SCI format payload'* field the fields of SCI format 2-A, set as specified above.  - if *'Embedded SCI format'* indicates that SCI format 2-B is embedded within this SCI format 2-D then the UE shall include in the *'Embedded SCI format payload'* field the fields of SCI format 2-B, set as specified above.  **<<< UNCHANGED PARTS OMITTED >>>**  --------------------------------------- End of text proposal #13.2 to TS 38.214 v18.2.0 --------------------------- |

**R1-2403564** Moderator Summary #1 on resource allocation for SL PRS Moderator (Qualcomm)

Agreement

With regards to the *dci-FormatsSL* and in relation to DCI format 3\_2:

* Add the following 3 new codepoints to the existing *dci-FormatsSL*
  + formats3-2
  + formats3-0 and formats3-2
  + formats3-0-And-3-1 and formats3-2
* Send an LS to RAN2 with the above agreement
  + RAN1 is still discussing whether to add a 4th codepoint for formats3-1 and formats3-2

R1-2403731 Draft LS on the dci-FormatsSL and DCI format 3\_2 Qualcomm Incorporated

R1-2403732 LS on the dci-FormatsSL and DCI format 3\_2 RAN1, Qualcomm Incorporated

Proposal

The draft LS in R1-2403731 is endorsed. Final LS in R1-2403732.

Agreement

Support the scenario that the SL-PRS Rx UE reports measurements for multiple Rx ARP-IDs for the same resource or different resource(s) from the same Tx UE in a single measurement report.

Indicate this agreement in the reply LS to RAN2 LS on decisions on SLPP.

Agreement

Respond in the reply LS to RAN2 LS on decisions on SLPP that:

* From RAN1 perspective, for location calculations for UE-based SL positioning, it should be possible that the Rx UE can be provided the information about association between Tx ARP-ID and already transmitted SL PRS. It is unclear whether current signalling design from RAN2 can support this scenario.

Agreement

RAN1’s response on Question 1 is as follows:

Regarding the minimum time gap between the last symbol of SL-PRS and the start of the first symbol of PSFCH reception that is associated with the PSSCH transmission on SL-PRS shared resource pool, a new RRC parameter is NOT needed.

## RAN1 #117

Agreement

The draft LS to RAN2 on higher layer parameters is endorsed in R1-2405402. Final LS in R1-2405403.

Agreement

The following draft CRs are endorsed for the editors’ specs alignment: R1-2405404, R1-2405405, R1-2405449, R1-2405406.

Agreement

There is no consensus in RAN1 to provide reply LS to RAN2 for the LS from RAN2 on SLPP agreement (R1-2403825).

Agreement

Endorse the TP below.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | * ***Reason for change:*** | * The reception of sync source type should not be limited to UE-based positioning per the agreement. | |  |  | | * ***Summary of change:*** | * 1. Delete “For UE-based positioning” from the paragraph on the reception of sync source type and RTD, and start a new paragraph. * 2. Start a new paragraph for SL RSTD reporting. | |  |  | | * ***Consequences if not approved:*** | * Specification is not aligned with UE behaviour. | |
| |  | | --- | | **8.4.4 SL PRS reception procedure**  The UE may be configured to measure and report one or more of the SL RSTD, SL Rx-Tx time difference, SL RTOA, SL PRS-RSRPP, for the first detected path and up to 8 additional detected paths, and SL PRS-RSRP measurements. The UE may be configured to measure and report one or more of the SL AoA, SL PRS-RSRPP for the first path and up to 2 additional detected paths, and SL PRS-RSRP measurement.  The UE may report an ARP ID associated with the reported measurements. The UE may provide the ARP location information via *sl-ARP-LocationInfoPerTxUE*.  The UE uses the same ARP for both the transmission and reception of sidelink positioning reference signals while performing an SL Rx-Tx time difference measurement.  The UE may include SL PRS resource ID(s) when it reports one or more of the SL RSTD, SL Rx-Tx time difference, SL RTOA, SL AoA, SL PRS-RSRP, and SL PRS-RSRPP measurements.  For the SL RSTD, SL Rx-Tx time difference, SL RTOA, SL AoA, SL PRS-RSRP, and SL PRS-RSRPP measurements, the UE reports an associated SL PRS reception timestamp via higher layer parameter *Timestamps*. For SL Rx-Tx time difference, the UE may report an associated SL PRS transmission timestamp via higher layer parameter *tx-TimeInfo* and the UE may be configured to report a SL PRS transmission timestamp via *associatedSL-PRS-TxTimeStampRequest*. The timestamp includes the SFN, slot number, and optionally *nr-PhysCellID*, *nr-ARFCN*, *nr-CellGlobalID*, or the timestamp includes DFN and slot number. The timestamp of DFN and slot number may include synchronization source indication of DFN.  The UE may be configured to report up to N Rx-Tx time difference measurements for the same SL PRS transmission associated with N different SL PRS receptions for the same pair of UE(s). The UE may be configured to report up to N Rx-Tx time difference measurements for the same SL PRS reception associated with N different SL PRS transmissions for the same pair of UE(s).  The UE may report, LoS/NLoS indicator(s) via *los-NLOS-Indicator* associated with each SL RSTD, SL Rx-Tx time difference, SL RTOA, SL AoA, SL PRS-RSRP, and SL PRS-RSRPP measurements.  The UE may report synchronization source type via *syncSourceType* and/or relative time difference with the associated quality metric, via *sl-RTD-Info*. If reported *syncSourceType* is *gNB-eNB*, the UE may report cell identity information.  The UE may be provided with synchronization source type of a UE and/or the relative time difference with the associated quality metric, via *syncSourceType* and *sl-RTD-Info, respectively*.  For the SL RSTD measurement, the UE may report a reference UE information.  < Unchanged parts are omitted > | |

Agreement

Final CR is agreed in R1-2405707.

Agreement

Send an LS to RAN2 indicating that RAN1 agrees to introduce the 4th codepoint for *formats3-1-And-3-2*

* Up to RAN2 to decide whether this codepoint can be added in the existing parameter of *dci-FormatsSL* or not.

Agreement

Send an LS to RAN2 with the following relevant parameters related to the resource allocation mode 2 in a dedicated SL PRS resource pool.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub-feature group** | **RAN1 specification** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** |
| SL PRS configuration in a dedicated resource pool | 38.214 | sl-SelectionWindowList- Dedicated-SL-PRS-RP | New | List of selection window configuration | SEQUENCE (SIZE (8)) OF SL-PRS-SelectionWindowConfig-**Dedicated-SL-PRS-RP** | Per dedicated SL PRS resource pool | Yes | 38.331 |
| SL PRS configuration in a dedicated resource pool | 38.214 | sl-SelectionWindowConfig-Dedicated-SL-PRS-RP | New | Parameter that determines the end of the selection window in the resource selection for a SL PRS with respect to priority indicated in SCI | sl-PRS-Priority-r18 INTEGER (1..8) and sl-PRS-SelectionWindow-r18 ENUMERATED {n1, n5, n10, n20}  **Value n1 corresponds to 1\*2µ, value n5 corresponds to 5\*2µ, and so on, where µ = 0,1,2,3 refers to SCS 15,30,60,120 kHz respectively** | Per dedicated SL PRS resource pool | Yes | 38.331 |
| SL PRS configuration in a dedicated resource pool | 38.214 | sl-Thres-RSRP-List- DedicatedSL-PRS-RP | New | Indicates a list of 64 thresholds, the threshold should be selected based on the priority in the decoded SCI and the priority in the SCI to be transmitted | SEQUENCE (SIZE (64)) OF SL-PRS-Thres-RSRP | Per dedicated SL PRS resource pool | Yes | 38.331 |
| SL PRS configuration in a dedicated resource pool | 38.214 | sl-PreemptionEnable- Dedicated-SL-PRS-RP | New | Indicates whether pre-emption is disabled or enabled in a resource pool. I f the field is present and the value is pl1, pl2, and so on (but not enabled), it means that pre-emption is enabled and a priority level p\_preemption is configured. If the field is present and the value is enabled, the pre-emption is enabled (but p\_preemption is not configured) and pre-emption is applicable to all levels. | ENUMERATED {enabled, pl1, pl2, pl3, pl4, pl5, pl6, pl7, pl8} | Per dedicated SL PRS resource pool | Yes | 38.331 |

Agreement

Send an LS to RAN2 with the following RRC parameters:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub-feature group** | **RAN1 specification** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Required for initial access or IDLE/INACTIVE** | **Specification** |
| Network scheduled SL positioning | 38.212 | SL-PRS-RNTI | New | Parameter indicate the SL-PRS-RNTI used for monitoring the network scheduling to transmit NR sidelink positioning reference signal (i.e. the mode 1) for dynamic grants | RNTI-Value | Per UE | / | 38.331 |
| Network scheduled SL positioning | 38.212 | SL-PRS-CS-RNTI | New | Parameter indicate the RNTI used to scramble CRC of DCI format 3\_2 for configured grants | RNTI-Value | Per UE | / | 38.331 |

Agreement

Send an LS to RAN2 with the following action item(s):

* **Action Item 1:** Include the additional values for the value range of “sl-PRS-ResourceReservePeriodList”: {ms160, ms320, ms640, ms1280, ms2560, ms5120, ms10240}.
* **Action Item 2:** Suggest the removal of the sentence “The possible resource reservation period are periodicities for SL communication and the ones defined for DL-PRS” in the description of the sl-PRS-ResourceReservePeriodList field
* **Action Item 3:** Suggest the addition of the following sentence “The value ms0 is always configured” in the description of the sl-PRS-ResourceReservePeriodList field

Agreement

The TP below is endorsed for TS38.202

|  |  |  |
| --- | --- | --- |
|  |  | |
| * ***Reason for change:*** | | * RAN1 agreed to introduce two new UE capabilities of SL CA and SL PRS transmission/reception in RAN1#116-bis.   **Agreement**  For a band configured with SL CA, confirm the related working assumption from RAN1 #116 with the introduction of the following new UE capabilities:   * + One UE capability for SL PRS transmission for a band configured with SL CA   + One UE capability for SL PRS reception for a band configured with SL CA   + Note: there will not be two separate FG components for shared RP and dedicated RP   However, the impact on the sidelink "Transmission Type" combinations and the "Reception Type" combinations is not captured yet when UE reports such capabilities. |
|  | |  |
| * ***Summary of change:*** | | * Capture the impact on the sidelink "Transmission Type" combinations and the "Reception Type" combinations when UE reports the capabilities of SL CA and SL PRS transmission/reception. |
|  | |  |
| * ***Consequences if not approved:*** | | * The sidelink "Transmission Type" combinations and the "Reception Type" combinations when UE reports the capabilities of SL CA and SL PRS transmission/reception is not supported, which is not aligned with RAN1 agreement. |
|  | |  |
| * ***Clauses affected:*** | | * 6.3 |
|  | |  |

**6.3 Sidelink**

The tables 6.3-1 and 6.3-2 describe the possible combinations of physical channels that can be sent simultaneously in the sidelink by a UE. Table 6.3-1 introduces notation for a sidelink "Transmission Type" which represents a physical channel, and any associated transport channel. Table 6.3-2 describes the combinations of these "Transmission Types" which are supported by the UE depending on capabilities [8, TS 38.306], and enumerates how many of each can be transmitted simultaneously.

**Table 6.3-1: Sidelink "Transmission Types"**

|  |  |  |  |
| --- | --- | --- | --- |
| **"Transmission Type"** | **Physical Channel** | **Associated Transport Channel** | **Comment** |
| A | PSBCH | SL-BCH |  |
| B | PSSCH | SL-SCH |  |
| C | PSCCH | SL-SCH |  |
| D | PSFCH | N/A |  |
| E | SL PRS | N/A |  |

**Table 6.3-2: Sidelink "Transmission Type" combinations**

|  |  |
| --- | --- |
| **Supported Combinations** | **Comment** |
| A | Note 2 |
| B | Note 2 |
| C | Note 2 |
| E | Note 4 |
| E | Note 5 |
| D | Note 2 |
| B+C | Note 2 |
| Note 1: Depending on the UE capability, the UE may be able to perform simultaneous Uplink and Sidelink transmissions. If the simultaneous transmission of Sidelink and Uplink is beyond the UE capability, the one not prioritized can be dropped according to [TS 38.321].  Note 2: Depending on the UE capability, the UE may be able to perform simultaneous sidelink communication transmissions of the same sidelink “Transmission Type” combinations across multiple SL carriers.  Note 3: Simultaneous transmissions over multiple SL carriers with one or more UL carriers is left up to UE implementation.  Note 4: Depending on the UE capability, the UE may be able to perform simultaneous SL PRS transmission and PSSCH transmission(s) for a shared SL PRS resource pool across multiple SL carriers.  Note 5: Depending on the UE capability, applicable for a dedicated SL PRS resource pool across multiple SL carriers. | |

The tables 6.3-3 and 6.3-4 describe the possible combinations of physical channels that can be received simultaneously in the sidelink by a UE. Table 6.3-3 introduces notation for a sidelink "Reception Type" which represents a physical channel, and any associated transport channel. Table 6.3-4 describes the combinations of these "Reception Types" which are supported by the UE depending on capabilities [8, TS 38.306], and enumerates how many of each can be received simultaneously.

**Table 6.3-3: Sidelink "Reception Types"**

|  |  |  |  |
| --- | --- | --- | --- |
| **"Reception Type"** | **Physical Channel** | **Associated Transport Channel** | **Comment** |
| A | PSBCH | SL-BCH |  |
| B | PSSCH | SL-SCH |  |
| C | PSCCH | SL-SCH |  |
| D | PSFCH | N/A |  |
| E | SL PRS | N/A |  |

**Table 6.3-4: Sidelink "Reception Type" combinations**

|  |  |
| --- | --- |
| **Supported Combinations** | **Comment** |
| A |  |
| B | Note 1, Note 2 |
| C | Note 1, Note 2 |
| E | Note 3, Note 5 |
| E | Note 4 |
| D | Note 2 |
| B+C | Note 1, Note 2 |
| Note 1: Corresponds to simultaneous reception within one sub-channel  Note 2: Depending on the UE capability, the UE may be able to perform simultaneous sidelink communication receptions of the same sidelink “Reception Type” combinations across multiple SL carriers.  Note 3: Applicable for a shared SL PRS resource pool. Corresponds to simultaneous reception within one sub-channel.  Note 4: Applicable for a dedicated SL PRS resource pool with M1≥1. Corresponds to simultaneous reception within one dedicated SL PRS resource pool.  Note 5: For a shared SL PRS resource pool, depending on the UE capability, the reception(s) of SL-PRS in a single SL carrier can be simultaneously received with PSSCH in other one or more SL carrier(s). | |

Agreement

Final CR is agreed in R1-2405544.

Agreement

The draft CR R1-2404372 is endorsed for the spec editor’s alignment CR for TS38.213.

Agreement

Endorse the TP below for TS 38.214 editor’s alignment CR. **Editor to submit CR.**

|  |  |  |
| --- | --- | --- |
| * ***Reason for change:*** | 1. UE will report the DL RSCPD measurement together with DL RSTD measurement instead of DL RSTD. The current description in TS 38.214 is not aligned with other measurement report and the following agreement:  |  | | --- | | **Agreement in RAN1#112bis-e**  Introduce DL reference carrier phase (DL RSCP) and NR DL reference carrier phase difference (DL RSCPD) as DL carrier phase measurements.   * Note: It is up to RAN4 to decide whether and how to define the requirements for DL RSCP and/or DL RSCPD. No LS needed to RAN4 for this note. * DL RSCP can be reported together with UE Rx – Tx time difference measurement * DL RSCPD can be reported together with RSTD measurement * FFS: details on how to eliminate unknown initial Rx phase with RSCP/RSCPD reporting can be further discussed |  1. For Rel-18 CPP, UE may be configured report quality metrics corresponding to phase measurement. However, the IE name *[phase quality index]* in the current TS 38.214 is not aligned with higher layer parameter. 2. There are several typos in 5.1.6.5.2, duplicate spaces in ‘*nr-PRU-RSCP-MeasInfo* or’ and ‘*phaseQualityValue* which’, missing spaces in ‘*NR-PhaseQuality*corresponding’ and ‘measurementfrom’. |
|  |  |
| * ***Summary of change:*** | 1. Correct the DL RSCPD measurement report. 2. Correct the IE name *[phase quality index] -> phaseQualityValue.* 3. Correct several typos in 5.1.6.5.2. |
|  |  |
| * ***Consequences if not approved:*** | 1. The description of DL RSCPD measurement report is not aligned with other measurement report and agreement.  * The IE name *[phase quality index]* is not aligned with higher layer parameter.  1. There are several typos in 5.1.6.5.2. |
|  |  |
| * ***Clauses affected:*** | * 5.1.6.5.2 |
|  |  |

**5.1.6.5.2 PRS for carrier phase positioning**

For DL UE positioning measurement reporting in higher layer parameter *NR-DL-TDOA-SignalMeasurementInformation,* the UE may be configured to report the DL Reference Signal Carrier Phase Difference (RSCPD) [7, TS 38.215] measurement along with the DL RSTD measurement. When the UE reports RSCPD measurements, the reference *nr-DL-PRS-ReferenceInfo* is the same as the one reported, for the RSTD measurements. For DL UE positioning measurement reporting in higher layer parameter *NR-Multi-RTT-SignalMeasurementInformation*, the UE may be configured to report the DL Reference Signal Carrier Phase (RSCP) measurement [7, TS 38,215] along with the UE Rx-Tx time difference measurement. When the UE reports DL RSCPD measurement(s) along with DL RSTD measurement(s) or DL RSCP measurement(s) along with UE Rx-Tx time difference measurement(s), the DL RSCPD and/or DL RSCP measurement(s) should be measured from a single DL PRS positioning frequency layer. For a UE in RRC\_CONNECTED state, DL RSCP/RSCPD measurements are measured within the configured measurement gap.

<omitted text>

The UE may be configured to report quality metrics *NR-PhaseQuality* corresponding to the DL RSCP and RSCPD measurements which include the following fields [17, TS 37.355]:

*- phaseQualityValue* which provides the uncertainty of the measurement

*- phaseQualityResolution* which specifies the resolution levels used in the *phaseQualityValue* field.

The UE in RRC\_INACTIVE or RRC\_IDLE mode is expected to perform the DL RSCP or DL RSCPD measurement from the bandwidth of a DL PRS resource including outside of the initial downlink bandwidth part.

<omitted text>

Agreement

Endorse the below for TS 38.214 clause 6.2.1.4.2.

|  |  |  |
| --- | --- | --- |
| * Reason for change | * For Rel-17 positioning SRS in RRC\_INACTIVE state, SRS is deprioritized (i.e. dropped) if the SRS along with the switching period collides with other signals/channels as shown below.  |  | | --- | | * If an SRS symbol for positioning outside the initial BWP in RRC\_INACTIVE mode including the switching time, indicated in higher layer parameter *switchingTimeSRS-TX-OtherTX*, in unpaired spectrum, subject to UE capability, collides in time domain with other DL signals or channels or UL signals or channels, the colliding SRS symbol for positioning is dropped. |  * For Rel-18 positioning SRS bandwidth aggregation in RRC\_INACTIVE state, SRS should be also deprioritized and dropped if the SRS along with the guard period collides with other signals/channels. However, such priority rule is missed in the current TS 38.214. |
| * Summary of change | * Add a new sentence to clarify that for positioning SRS bandwidth aggregation in RRC\_INACTIVE state, SRS should be dropped if the SRS along with the guard period collides with other signals/channels. |
| * Consequences if not approved | * The priority rule of SRS bandwidth aggregation is unclear. |
| * Text proposal | ---------------------------- Start of Text Proposal for TS 38.214 ----------------------------  **6.2.1.4.2 SRS bandwidth aggregation for positioning measurements**  <omitted text>  When an SRS resource configured in a CC without PUSCH or PUCCH is linked for bandwidth aggregation with an SRS resource configured in an active UL BWP of another CC in the same band, there is a guard period during which the UE is not expected to transmit or receive other signals or channels in this band, or any other affected band(s), subject to UE capability.  For the linked SRS resource sets for bandwidth aggregation across CCs in RRC\_CONNECTED state, if an SRS configured by the higher layer parameter *SRS-PosResource*, along with the guard period when applicable, collides with other signals or channels on a symbol and if the SRS in that symbol is dropped, SRS transmission of the linked SRS resource sets across all CCs is dropped on that symbol.  For the linked SRS resource sets for bandwidth aggregation in RRC\_INACTIVE state, if an SRS configured by the higher layer parameter *SRS-PosResource*, along with the guard period when applicable, collides with other signals or channels on a symbol, SRS transmission of all linked SRS resource sets is dropped on that symbol.  <omitted text>  ---------------------------- End of Text Proposal for TS 38.214 ---------------------------- |

Final CR in R1-2405606.

Agreement

The draft CR in R1-2405482 is endorsed with the following modification:

- is the hop transmission counter in the time domain, where corresponds to the order of the higher-layer parameter *SlotOffsetForRemainingHops* in *slotOffsetForRemainingHopsList*.

Final CR in R1-2405601.

**Rel-18 NR\_pos\_enh2**

R1-2403824 LS to RAN1 on bandwidth aggregation RAN2, ZTE

RAN2 LS in response to R1-2401708. Response to RAN2 LS necessary. To be handled in agenda item 8.1 (Positioning). To be moderated by Chuangxin (ZTE).

**R1-2405457** Summary for reply LS on SRS BW aggregation Moderator (ZTE)

Agreement

Reply RAN2 LS that up to 32 aggregated combinations are applicable to RRC\_CONNECTED state. RAN1 thinks up to 16 aggregated combinations should be sufficient for RRC\_INACTIVE state.

Agreement

The draft LS reply in R1-2404982 is endorsed. Final LS in R1-2405456.

**Rel-18 NR\_pos\_enh2**

R1-2403830 LS on SL positioning measurements RAN4, Huawei

Response to RAN4 LS necessary. To be handled in agenda item 8.1 (Positioning). To be moderated by Jinhuan (Huawei).

**R1-2405509** FLS#1 on reply LS on SL positioning measurement Huawei

**R1-2405510** DRAFT reply LS on SL positioning measurement Huawei

Agreement

Suggested reply:

RAN1 confirms requesting and/or reporting only SL PRS-RSRP or SL PRS-RSRPP without any other SL positioning measurements is not supported.

Agreement

Suggested reply:

In addition, RAN1 would like to inform RAN4 and RAN2 of the following with regards to the mapping between the mandatory measurement and the targeted SL positioning method:

* SL-RSTD is mandatory for SL-TDOA
* SL RTOA is mandatory for SL-TOA
* SL UE Rx - Tx time difference is mandatory for SL-RTT
* at least one of SL AoA/ZoA should be reported for SL-AoA

Agreement

The draft LS in R1-2405510 is endorsed with the updated of the agreements as agreed above. Final LS in R1-2405511.

**Rel-18 NR\_pos\_enh2**

R1-2404198 LS on DL-AoD measurements in NR-PRU-DL-Info forwarded to target UE RAN2, Nokia

Response to RAN2 LS necessary. To be handled in agenda item 8.1 (Positioning). To be moderated by Kevin (Nokia)

R1-2405584 Moderator Summary on LS reply on DL-AoD Assistance Information Moderator (Nokia)

**R1-2405585** Draft Reply LS on DL-AoD measurements in NR-PRU-DL-Info forwarded to target UE Moderator (Nokia)

Agreement

The draft LS in R1-2405585 is endorsed with the following response:

**RAN1 Response:**

There is no RAN1 consensus on whether LMF forwards NR DL-AoD measurements (NR-DL-AoD-SignalMeasurementInformation-r16 IE) of the PRU to the target UE as assistance data, as companies have differing views on whether this is useful.

Final LS in R1-2405586.