**3GPP TSG-RAN WG2 Meeting #124R2-230xxxx**

**Xiamen, China, October, 2023**

**Agenda item:** 7.2.2

**Source:** Intel Corporation

**Title:** Summary of [Post123][401][POS] RAN2 impact from SL-PRS parameters (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the summary of the following email discussion:

* [Post123][401][POS] RAN2 impact from SL-PRS parameters (Intel)

Scope: Evaluate the impact on RAN2 (SLPP/RRC/MAC) of the parameters for SL-PRS configuration and how to capture them in RAN2 specs, taking into account any information from RAN1.

Intended outcome: Report to next meeting

Deadline: Long

RAN1 has provided the latest parameter list including the set of newly defined parameters for SL-PRS (resource) configuration as well as SL positioning measurement result report [1]. As part of this email discussion, RAN2 needs to evaluate the impact on RAN2 specification of the parameters related to SL-PRS configuration. Specifically, the scope of this email discussion is to discuss and decide how to capture the set of parameters in the RAN2 specifications as well as identify the aspects which require more discussion and input from RAN2.

Contact List

|  |  |  |
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# Discussion

### 2.1 SL-PRS configuration related parameters

RAN1 has included the following parameters related to the SL-PRS resource configuration in [1]:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **Parameter name in the spec** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Specification** |
| NR\_pos\_enh2-Core | SL PRS configuration in a dedicated resource pool | sl-TimeResource | This field indicates the bitmap of the SL PRS dedicated resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle. | BIT STRING (10 .. 160) | Per dedicated resource pool | FFS for RAN2 WG |
| NR\_pos\_enh2-Core | SL PRS configuration in a dedicated resource pool | sl-StartRB | This field indicates the lowest RB index of the SL PRS dedicated resource pool with respect to the lowest RB index of a SL BWP. | TBD | Per dedicated resource pool | FFS for RAN2 WG |
| NR\_pos\_enh2-Core | SL PRS configuration in a dedicated resource pool | sl-RB-Number | This field indicates the number of PRBs in the corresponding SL PRS dedicated resource pool, which consists of contiguous PRBs only. | TBD | Per dedicated resource pool | FFS for RAN2 WG |
| NR\_pos\_enh2-Core | SL positioning RA | sl-Pos-AllowedResourceSelectionConfig | Allowed resource allocation method configured per resource pool | c1: only sensing allowed c2: only random resource seleciton allowed c3: sensing and random resource selection allowed | Per dedicated resource pool | 38.331 |
| NR\_pos\_enh2-Core | PSCCH in dedicated resource pool | timeResourcePSCCH-Dedicated-SL-PRS-RP | This field indicates the number of symbols for PSCCH in a dedicated SL PRS resource pool. | 2 or 3 symbols | Per dedicated resource pool | FFS for RAN2 WG |
| NR\_pos\_enh2-Core | PSCCH in dedicated resource pool | freqResourcePSCCH-Dedicated-SL-PRS-RP | This field indicates the number of PRBs for PSCCH in a dedicated SL PRS resource pool. | 10, 12 15, 20, 25 | Per dedicated resource pool | FFS for RAN2 WG |
| NR\_pos\_enh2-Core | SL positioning RA | reservationPeriodAllowed-Dedicated-SL-PRS-RP | Set of possible resource reservation period in the unit of ms allowed in the resource pool. Up to 16 values can be configured per resource pool. | Ref: Periodicities for legacy SL communication and the ones defined for DL-PRS | Per dedicated resource pool | 38.331 |

To capture RAN1 parameters for SL-PRS configuration, two cases need to be considered:

Case 1: the SL-PRS configuration related parameters are used for Tx UE to know how to transmit the SL PRS;

Case 2: the SL-PRS configuration related parameters are used for Rx UE to know how to receive and perform measurement on the SL PRS from Tx UE;

For the parameters listed above, all of them are related to case 1, i.e. configuration for the Tx UE to perform SL-PRS transmission.

**Following Q 1-1—1-5 are related to case 1, i.e. how to configure SL-PRS configuration for the Tx UEs.**

It should be noted that all the above parameters are essentially adopted from the SL communication resource pool configuration already present in RRC specification [2]. Specifically, the *SL-ResourcePool* IE contains these parameters as they pertain to the configuration of a specific SL communication resource pool. Firstly, it is worth noting that RAN1 has agreed to support both dedicated and shared resource pools for SL-PRS transmission. The rapporteur thinks that these parameters are specifically applicable for the dedicated resource pool, since the shared resource pool which can be used for both SL communication and SL-PRS transmission may follow the legacy configuration as before. It would be good for companies to confirm if this is indeed the common understanding in RAN2.

**Q1-1: Do companies agree that the set of SL-PRS related parameters included in the RAN1 provided list pertain specifically to the dedicated resource pool for SL-PRS?**

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/no** | **Comments, if any** |
| Huawei, HiSilicon | Yes | The above parameters are for dedicated RP.  One comment to the rapporteur’s understanding on the following statement:  **Following Q 1-1—1-5 are related to case 1, i.e. how to configure SL-PRS configuration for the Tx UEs.**  In our understanding, these parameters should also be provided to the Rx UE as well, which means that they should be present in both Tx pools and Rx pools. For a UE that only supports SL PRS Rx in the dedicated RP, provision of the configuration only for the RP is sufficient. |
| OPPO | Yes | We can make it as a working assumption and may adjust it later if necessary. |
| vivo | Yes |  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Philips | Yes | As per the 6th column it is mentioned that these are per dedicated resource pool.  Agree with Huawei’s view that these parameters should also be provided to Rx UE. |
| CATT | Yes |  |
| Ericsson | Yes | Shared pool will be the extension of the SL-ResourcePool-r16 |
| Sony | Yes |  |
| Apple | Yes |  |
| Spreadtrum communications | Yes |  |
| CEWiT | Yes |  |
| Qualcomm | Yes |  |

We firstly need to consider the configuration aspect, i.e. how these parameters are configured to the UE, especially considering the in coverage and out of coverage scenarios. While RAN1 has made agreements relating to SL-PRS **resource** configuration, RAN2 needs to discuss the configuration of the SL-PRS related parameters themselves. For this case as well, we can look at the SL communication resource pool configuration as a starting point for discussion. For reference, in case of in coverage, SIB signaling contains the cell specific SL resource pool configuration for UE to use in RRC\_IDLE/RRC\_INACTIVE while the gNB can also provide the UE with dedicated RRC configuration containing SL resource configuration for RRC\_CONNECTED (mode 1). For out of coverage, the UE relies on pre-configured resource pool configuration (mode 2). Since RAN1 has defined scheme 1 and scheme 2 correspondingly for the case of SL-PRS resource selection, it needs to be discussed in RAN2 whether it makes sense to follow the same configuration principle as SL communication, i.e. rely on gNB for in coverage and pre-configuration for out of coverage case.

**Q1-2: Do companies agree that the configuration of SL-PRS related parameters to the UE shall follow the same principle as SL communication, i.e. rely on NW/gNB for in coverage and pre-configuration for out of coverage case?**

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon | Yes | But one comment on the configuration for CONNECTED is that it does not necessarily needs to be for mode 1. |
| OPPO | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Philips | Yes | Agree with Huawei. Need to clarify in the text above the question that mode 1 / mode 2 refer to SL resource allocation and not necessarily to RRC configuration. |
| CATT | Yes |  |
| Ericsson | Yes | Agree with HW. Moreover, NW should secure that not both modes configured to overlapped in same slot. |
| Sony | Yes |  |
| Apple | Yes |  |
| Spreadtrum communications | Yes |  |
| CEWiT | Yes |  |
| Qualcomm | Yes |  |

If the answer to the above question is yes, rapporteur thinks that there can be two different ways to capture them in the RRC specification:

1. Reuse the existing signaling for a given resource pool (SL-ResourcePool) and define any new SL-PRS related parameters as needed within
2. Define a new IE (e.g. SL-PRS-ResourcePool) which (potentially) duplicates some of the parameters from SL-ResourcePool for the dedicated pool

From rapporteur perspective, both options can work but the most logical way to define the SL-PRS configuration parameters is to reuse the *SL-ResourcePool* for signaling the new SL-PRS specific parameters. This means that the dedicated SL-PRS pool configuration can be added within SL-BWP common and UE specific configuration for a given SL frequency, which is the same principle as other SL configuration. This also minimizes the amount of new signaling to be defined and given that most new parameters RAN1 is expected to define for SL-PRS are taken from the legacy SL resource pool configuration anyway, very few new fields may need to be defined. The rapporteur has also included in section 3 an example TP of how to capture the SL-PRS related parameters. In order to support SIB based and dedicated configuration for SL-PRS configuration, the *SL-BWP-Config* and *SL-BWP-ConfigCommon* are modified to include *SL-BWP-PRSPoolConfig* and *SL-BWP-PRSPoolConfigCommon* respectively, which contain configuration for dedicated resource pool for SL-PRS for a given SL BWP. Companies are invited to comment on whether they agree to consider it as a baseline to capture the RAN1 indicated parameters.

**Q1-3: With respect to capturing SL-PRS related parameters in RAN2 specification, which option do companies prefer?**

1. **Use RRC: Reuse the existing signaling for a given resource pool (SL-ResourcePool) and define any new SL-PRS related parameters as needed within**
2. **Use RRC: Define a new IE for dedicated SL-PRS resource pool (e.g. SL-PRS-ResourcePool) which (potentially) duplicates some of the parameters from SL-ResourcePool**
3. **Use SLPP (if this option is chosen, please indicate how UE can be configured while in coverage and out of coverage)**
4. **Other (please comment how to capture in spec)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Option** | **Comments, if any** |
| Huawei, HiSilicon | 1) or 2) | For 1), it should be captured in the IE description or field description that some fields are not present for the dedicated RP.  For 2), it is cleaner for the reader while there are some additional work |
| OPPO | 1 |  |
| vivo | 2) | In the *SL-ResourcePool*, there are many fields which are not included in the above RAN1 parameter list, e.g., sl-PSSCH-Config, sl-PSFCH-Config. Therefore, we prefer to define a new IE for dedicated SL-PRS resource pool to reduce signalling overhead.  SL-ResourcePool-r16 ::= SEQUENCE {  sl-PSCCH-Config-r16 SetupRelease { SL-PSCCH-Config-r16 } OPTIONAL, -- Need M  sl-PSSCH-Config-r16 SetupRelease { SL-PSSCH-Config-r16 } OPTIONAL, -- Need M  sl-PSFCH-Config-r16 SetupRelease { SL-PSFCH-Config-r16 } OPTIONAL, -- Need M  sl-SyncAllowed-r16 SL-SyncAllowed-r16 OPTIONAL, -- Need M  sl-SubchannelSize-r16 ENUMERATED {n10, n12, n15, n20, n25, n50, n75, n100} OPTIONAL, -- Need M  dummy INTEGER (10..160) OPTIONAL, -- Need M  sl-StartRB-Subchannel-r16 INTEGER (0..265) OPTIONAL, -- Need M  sl-NumSubchannel-r16 INTEGER (1..27) OPTIONAL, -- Need M  sl-Additional-MCS-Table-r16 ENUMERATED {qam256, qam64LowSE, qam256-qam64LowSE } OPTIONAL, -- Need M  sl-ThreshS-RSSI-CBR-r16 INTEGER (0..45) OPTIONAL, -- Need M  sl-TimeWindowSizeCBR-r16 ENUMERATED {ms100, slot100} OPTIONAL, -- Need M  sl-TimeWindowSizeCR-r16 ENUMERATED {ms1000, slot1000} OPTIONAL, -- Need M  sl-PTRS-Config-r16 SL-PTRS-Config-r16 OPTIONAL, -- Need M  sl-UE-SelectedConfigRP-r16 SL-UE-SelectedConfigRP-r16 OPTIONAL, -- Need M  sl-RxParametersNcell-r16 SEQUENCE {  sl-TDD-Configuration-r16 TDD-UL-DL-ConfigCommon OPTIONAL, -- Need M  sl-SyncConfigIndex-r16 INTEGER (0..15)  } OPTIONAL, -- Need M  sl-ZoneConfigMCR-List-r16 SEQUENCE (SIZE (16)) OF SL-ZoneConfigMCR-r16 OPTIONAL, -- Need M  sl-FilterCoefficient-r16 FilterCoefficient OPTIONAL, -- Need M  sl-RB-Number-r16 INTEGER (10..275) OPTIONAL, -- Need M  sl-PreemptionEnable-r16 ENUMERATED {enabled, pl1, pl2, pl3, pl4, pl5, pl6, pl7, pl8} OPTIONAL, -- Need R  sl-PriorityThreshold-UL-URLLC-r16 INTEGER (1..9) OPTIONAL, -- Need M  sl-PriorityThreshold-r16 INTEGER (1..9) OPTIONAL, -- Need M  sl-X-Overhead-r16 ENUMERATED {n0,n3, n6, n9} OPTIONAL, -- Need S  sl-PowerControl-r16 SL-PowerControl-r16 OPTIONAL, -- Need M  sl-TxPercentageList-r16 SL-TxPercentageList-r16 OPTIONAL, -- Need M  sl-MinMaxMCS-List-r16 SL-MinMaxMCS-List-r16 OPTIONAL, -- Need M  ...,  [[  sl-TimeResource-r16 BIT STRING (SIZE (10..160)) OPTIONAL -- Need M  ]],  [[  sl-PBPS-CPS-Config-r17 SetupRelease { SL-PBPS-CPS-Config-r17 } OPTIONAL, -- Need M  sl-InterUE-CoordinationConfig-r17 SetupRelease { SL-InterUE-CoordinationConfig-r17 } OPTIONAL -- Need M  ]]  } |
| ZTE | 1 | The example RRC TP provided in the Annex is good to us. Only for the fields that has SL-PRS field description should be used in dedicated pool |
| Xiaomi | 1 |  |
| Philips | 2 | We think vivo’s approach for a new IE is cleaner and support their proposal. If option 1 is selected, SL resource pool follows a subchannel structure, should SL PRS resource pool use the same subchannel structure? |
| CATT | 1 | The annex looks good. |
| Ericsson | 2) | Agree with vivo 1) will result many fields to be igored, 2 is more neat. |
| Sony | 1) or 2) |  |
| Apple | 2 | 2 is cleaner |
| Spreadtrum communications | 1 |  |
| CEWiT | 1 |  |
| Qualcomm | 2 | Our view is a new IE, dedicated to SL-PRS enables self-contained SL positioning solution |

As part of the set of RAN1 parameters, one parameter that needs separate discussion is related to SL-PRS sequence generation, i.e. *sl-PRS-SequenceID* [1]*.* RAN1 notes that it is upto RAN2 to discuss how to capture this in specification, so some discussion is warranted.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **Parameter name in the spec** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** | **Specification** |
| NR\_pos\_enh2-Core | SL PRS sequence generation | sl-PRS-SequenceID | This field specifies the sequence Id used to initialize cinit value used in pseudo random generator for generation of SL PRS sequence for transmission on a given SL PRS Resource. The field may be provided to a Tx UE by higher layers - details up to RAN2, including consideration of Tx UE’s own higher layer. The field is also provided to Rx UE via SLPP/LPP. | {0, 1, …, 4095} | Per UE |  |

The relevant agreement from RAN1 is also reproduced below:

|  |
| --- |
| Working assumption:  For SL PRS sequence generation, the parameter  is defined as below:   * + is provided by higher layers to a Tx UE     - Details on higher layers, including consideration of Tx UE’s own higher layer, are up to RAN2     - The higher layer parameter is provided to an Rx UE via LPP/SLPP.     - FFS: If (pre-)configured for a resource pool and use of SL PRS for sensing is supported,  is based on 12 LSB bits CRC of PSCCH associated with the SL PRS   + Otherwise (i.e., if not provided by higher layers),  is based on 12 LSB bits CRC of PSCCH associated with the SL PRS |

In rapporteur’s understanding, this parameter serves as a seed for SL-PRS sequence generation and thus needs to be provided to the peer SL UE performing SL positioning measurements. Thus, RAN2 needs to decide how this parameter value is configured to the TX UE, i.e. whether it is configured by RRC (e.g. as part of the SL-PRS configuration parameters as in section 2.1) or upper/application layer (e.g. by the positioning service for a given positioning session). In case of the first option, companies are also invited to comment on where should this parameter be captured within RRC?

**Q1-4: What is companies view on how the SL-PRS sequence ID is configured to the TX UE?**

1. **Via RRC signaling (i.e. alongside the SL-PRS configuration parameters)**
2. **Via upper layer signaling (i.e. positioning service configures to the TX UE for a given positioning session)**
3. **Others (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Option** | **Comments, if any** |
| Huawei, HiSilicon | 3) | It could be set by the Tx UE internal higher layer, which could be outside 3GPP.  In general, we do not see the need to explicitly configure the sequence ID for the Tx UE. |
| OPPO | 1 | It could follow the legacy that the SRS configuration is provided by the gNB via the RRC signalling. In addition, we think it is reasonable to provide SL-PRS sequence ID alongside with the SL-PRS configuration. |
| vivo | 2) with comments | Is “Positioning service” a typo and should be “positioning server”?  Option 1 is obvious to not applicable to UE-only operation.  As rapporteur said above, the SL-PRS sequence needs to be known by both Tx UE and Rx UE. We assume that different Tx UE should use different SL-PRS sequence ID in order to reduce the interference. We think that server should allocate/determine in a unified way the SL-PRS sequence ID. Therefore, the SL-PRS sequence should be transmitted by positioning server via SLPP message (Provide Assistance Data). |
| ZTE |  | There are 3 ways for a Tx UE to acquire the sequence ID for transmission:   * + - 1. Via RRC signaling from gNB. For out of coverage case, this can not work;       2. Via SLPP signaling from LMF/server UE. It suits for all coverage scenarios       3. Via Tx UE’s own high layer. However different Tx UEs may determine the same sequence ID, which may result in interference.   We prefer to use SLPP signaling to configure sequence ID to the Tx UE. |
| Xiaomi | 3 | Up to UE implementation to select sequence ID |
| Philips | 2 | We agree with the comments from vivo and ZTE. |
| CATT | 3 | Tx UE can decide the sequence ID by itself. We are wondering how the interference is big mentioned by ZTE. Usually the interference is avoided by sensing and different resources in different UE. And even in out of coverage scenario, where there is no gNB or LMF, so Tx UE decides sequence ID by itself. This sequence ID mechanism is intended to protect the privacy, and only UE with a known sequence ID can measure associated SL-PRS. |
| Ericsson |  | If 1), then SL-PRS sequence ID should be included in the RP config, otherwise not applicable to mode 2.  If 3) TX UE own higher layer to decide. |
| Sony | TBD | Depends whether it would be LMF, gNB or Server Ue that provides the sequence ID |
| Apple | 3 | Leave it to implementation in this Release |
| Spreadtrum communications | 2 | Slight prefer to option 2. Server UE or LMF configure sequence ID to the Tx UE via upper layer signaling. |
| CEWiT | 2 | LMF shall configure sequence ID for LMF-involved scenarios and SL positioning server UE shall provide for without LMF scenarios. |
| Qualcomm | 2) or 3) with comment | It seems better to decide treatment of all SL PRS configuration parameters later when all/more of them are known. Centralized control (using SLPP) may be needed from a server UE or LMF but there may be some exceptions. |

The RRC TP is provided in Annex 5, companies are invited to provide comments/suggestions if any.

**Q1-5: Any comments on the RRC TP for SL-PRS configuration:**

|  |  |
| --- | --- |
| **Company’s name** | **Comments, if any** |
| Huawei, HiSilicon | With regards to this IE SL-BWP-PRSPoolConfig, it appears that only a single Tx pool is allowed by mode 1 and mode 2 respectively. We do not think that should be the case. Multiple Tx pools, similar to the Rx pools, should be allowed to be (pre-)configured to the UE.  SL-BWP-PRSPoolConfig-r18 should be SL-BWP-PRSPoolConfigCommon-r18 under the field sl-BWP-PRSPoolConfigCommon-r18 |
| vivo | SL-BWP-PRSPoolConfigCommon-r17 should be SL-BWP-PRSPoolConfigCommon-r18;  sl-PRSRxPool-r17 should be sl-PRSRxPool-r18;  sl-PRSTxPoolSelected-r17 should be sl-PRSTxPoolSelected-r18;  SL-BWP-PRSPoolConfig-r18 in the SL-BWP-ConfigCommon-r16 should be SL-BWP-PRSPoolConfigCommon-r18; |
| ZTE | To HW:  in the TP SL-BWP-PRSPoolConfig, SL-TxPoolDedicated-r16 already contains multiple Tx pools |
| Philips | See answers to previous questions Q1-2 to Q1-4. |
| CATT | * *sl-SubchannelSize*: If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, It indicates the minimum granularity in frequency domain for mapping of PSCCH candidate resource in the unit of PRB in the dedicated resource pool. * *sl-ThreshS-RSSI-CBR* should be modified based on the SL-PRS CBR measurement in a dedicated resource pool * *sl-prs-overhead* should be added for rate matching of 2nd-stage SCI in shared resource pool * *sl-Thres-RSRP-List* should be modified, only PSCCH can be used to measure the RSRP in a dedicated resource pool.   Beside, the explicit (pre-)configuration of SL PRS resources should be added for a shared or a dedicated resource pool. |
| Ericsson | Agree with CATT that explicit (pre-)configuration of SL PRS resources should be added for a shared or a dedicated resource pool, wait for RAN1’s further agreement for the parameters. |

**Following Q 1-6 and Q1-7 are related to case 2, i.e. how to inform the Rx UE of the parameters for the SL PRS configuration used by Tx UE.**

The first question is which node should provide the assistance data to the Rx UE, the Rx UE or the Server. If it is done by the server, that means the server needs to obtain the SL-PRS configuration from each Tx UE first, which is similar to NRPPa procedure, and then forward the necessary assistance data to the Rx UE. The stage 3 impact is whether we capture SL-PRS configurations per Rx UE in the SLPP message, or only one SL-PRS configuration in the SLPP message.

**Q1-6: What is companies view on how the SL-PRS configuration (so far only SL-PRS sequence ID listed in RAN1 parameter list) of Tx UE is configured to the RX UE:**

1. **Tx UE via SLPP message *ProvideAssistanceData***
2. **Server via SLPP message *ProvideAssistanceData***
3. **Others (please comment)**

Note: If option 2 is preferred, please indicate whether we need to specify how the server get the SL-PRS configuration from the Tx UE?

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Option** | **Comments, if any** |
| Huawei, HiSilicon | 1) and 2) | Both should be supported considering different UE roles and different positioning methods. |
| OPPO | 2 | Firstly, the Tx UE may not know who are the Rx UEs involved in each positioning session. Secondly, for directly notifying the SL-PRS configuration towards the Rx UE via unicast, sidelink between the Tx UE and the Rx UE needs to be established in priori, which takes additional time. So we prefer a centralized method to distribute the SL-PRS configuration.  Regarding how to let the server get the SL-PRS configuration from the Tx UE, for the in-coverage scenario, the LMF could retrieve the SL-PRS configuration from the UE or the gNB serving the UE; for the out-of-coverage scenario, if the SL-PRS configuration is pre-configured by the RAN, the location server UE should retrieve the SL-PRS configuration from the UE directly. |
| vivo | 2) | For sidelink positioning, it is better that there is only one single control node, i.e., server. Server exchanges SLPP messages with the UEs. If supporting the SLPP message exchange between Tx UE and Rx UE, the complexity is quite high. |
| ZTE | 1) and 2) | For 2), we should also enable LMF via SLPP message ProvideAssistanceData to Rx UE |
| Xiaomi |  | There is no need to restrict which UE can send this information, from spec point of view, any UE can send this information. |
| Philips | 2 | Using the SL Positioning Server to coordinate the SL-PRS configuration of the UEs involved seems to be the cleanest solution and aligned with the role of the LMF in non-sidelink positioning. The SLPP protocol can be extended with some NRPPa related messages e.g., to fetch the SL-PRS configuration from the Tx UEs. |
| CATT | 1 | If the sequence ID is decided by Tx UE itself, the Rx UE is supposed to receive this ID which is not included in SCI decided by RAN1.  So there are two potential ways for Rx UE to receive this ID:  1). From Tx UE directly when there is no server UE.  2). From Server UE: Server UE is supposed to receive the sequence ID from Tx UE at first.  However considering there is only sequence ID in AD because other RAN1 parameters will be transferred in SCI, we prefer Tx UE to send the ID directly to Rx UE via SLPP. |
| Ericsson | 2) | As in legacy positioning, server can do this. |
| Apple | comments | For the purpose of this discussion and the SLPP TP it doesn’t matter whether it is Tx UE or Server UE. For now let’s focus on the ProvideAssistanceData message itself. |
| Spreadtrum communications | 2 | The center control entity, Server UE or LMF, can transmit the SL-PRS configuration to Rx UE. |
| CEWiT | 2 | LMF/SL positioning server shall do this as per the scenarios. |
| Qualcomm | 1) and 2) | A UE may be both Server and Tx UE. As such, the SLPP *ProvideAssistanceData* message sent by either a Tx UE or Server UE can provide SL-PRS configuration (from SLPP point of view if the SL-PRS configuration is defined in *ProvideAssistanceData*, it does not matter whether provided by (any) UE or server). |

The SL-PRS configuration should be common for all positioning methods, therefore rapporteur thinks it should be captured in section 6.3.1 Common information elements of TS38.355, and then invoked by positioning method specific IE, e.g. *Method-A-ProvideAssistanceData.*

**Q1-7: Do companies agree that the SL-PRS configuration is captured in section 6.3.1 Common information elements of TS38.355, and then invoked by positioning method specific IE, e.g. *Method-A-ProvideAssistanceData*?**

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon | See comments | It depends on how much the SL-PRS configuration can be different for different positioning methods. If there are a lot of difference between SL-PRS of posMethodA and posMethodB, we think it is not needed to be positioning method specific; while if the SL-PRS config is generally the same for different methods, it can follow the same approach as in LPP. |
| OPPO |  | Agree with Huawei |
| vivo |  | Related to Q2-2, if only one single method for SL positioning, no need to capture the SL-PRS configuration in common info elements. |
| ZTE | Yes | Same like LPP is fine. We can also wait for RAN1’s further parameter list to determine |
| Xiaomi |  | Can decide later when all the parameters are identified |
| Philips | Yes |  |
| CATT | Yes | We are fine to follow the legacy of 37.355. We don't observe there will be huge different SL-PRS signals between different methods. |
| Ericsson |  | Wait for RAN1’s more parameters to decide. |
| Apple |  | Agree with the majority – let’s finalize the details and decide on the section later |
| Qualcomm | No, with comments | Assuming the SL-PRS assistance data will be analogous to the DL-PRS assistance data (in principle), the SL-PRS configuration is neither "common" (in the strict sense) nor "method-specific".  We suggest introducing another PDU for "SL-PRS methods"; e.g. *Common-SL-PRS-MethodsIEs-XXX* (with XXX for capabilities, assistance data, location information).  This is in principle similar to GNSS in LPP, where we have GNSS-Common assistance data and GNSS-Specific assistance data, but implemented one level higher in the ASN.1 (i.e., directly in the RequestCapabilities/ProvideCapabilities, RequestAssistanceData/ProvideAssistanceData, RequestLocationInformation/ProvideLocationInformation.  We think the LPP approach, where we repeat the assistance data in each *method-ProvideAssistanceData* should be avoided for a new protocol.  In this Release, we have multiple "SL-PRS Methods" and all can use the same *Common-SL-PRS-MethodsIEsProvideAssistanceData* for example. The method-specific versions should still be defined in case there are any method-specific parameters. This can also reduce ASN.1 impacts for UEs which only support some (but not all) SL PRS methods. |

The SLPP TP on SL-PRS configuration will be provided once RAN2 gets the SL PRS configuration for Rx UE from RAN1.

### 2.2 SL Positioning Measurement Report related parameters

RAN1 has also included the following parameters related to the SL Positioning Measurement Reporting in [1]:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **Parameter name in the spec** | **Description** | **Value range** | **Specification** | **Comment** |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-losNlosIndicator | This parameter is used for UE to report LoS/NLoS information for UE measurements (including RSTD, RTOA, RSRP, RSRPP, AoA and UE Rx-Tx time difference) from UE to LMF or server UE.  The values correspond to the likelihood of LoS, with a value of 1 corresponding to LoS and a value of 0 corresponding to NLoS. | o Soft values: (0, 0.1, …, 0.9, 1) (in steps of 0.1) o Hard values: (0, 1) | 38.355 | Agreement LoS/NLoS indicator can be included in a sidelink positioning measurement report, considering different reporting targets (LMF and UE). • LOS/NLOS indicator specified in Rel-17 positioning is reused as much as possible. • No specification impact for how to set this indicator. • From RAN1 perspective, no performance requirements are expected to be defined for setting indicator in Rel-18. |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-PRS-RSTD | SL-RSTD measurement based on first path of arrival | TBD | 38.355 | Agreement  Support SL-based RSTD, Rx-Tx time difference, RToA, AoA, RSRPP measurement and report for the first path and optionally additional path.  • No specification impact for how to set the additional path measurements  • From RAN1 perspective, no performance requirements are expected to be defined for the additional-path measurements in Rel-18. |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | additionalPath-SL-PRS-RSTD | One or more additional detected path timing values for the Tx UE or SL PRS resource, relative to the path timing used for determining the SL-PRS-RSTD value | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-PRS-RTOA | SL-RTOA measurement based on first path of arrival | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | additionalPath-SL-PRS-RTOA | One or more additional detected path timing values for the Tx UE or SL PRS resource, relative to the path timing used for determining the SL-PRS-RTOA value | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-PRS-AoA | (SL-AoA, SL-ZoA) measurements based on first path of arrival | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | additionalPath-SL-PRS-AoA | (SL-AoA, SL-ZoA) measurements based on additional paths | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-PRS-RxTxTimeDiff | SL Rx-Tx time difference measurement based on first path of arrival | [-0.5 0.5] ms | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | additionalPath-SL-PRS-Rx-Tx-TimeDiff | One or more additional detected path timing values for the target UE or SL PRS resource, relative to the path timing used for determining the SL-PRS-RxTxTimeDiff value | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-PRS-RSRP | SL-RSRP measurement | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-PRS-RSRPP | SL-RSRPP measurement based on first path of arrival | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | additionalPath-SL-PRS-RSRPP | SL-RSRPP measurements based on additional paths | TBD | 38.355 |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-LCS-to-GCS-translation | A set of three angles which represent the translation from the local coordinate system (LCS) to the global coordinate system (GCS). The three angles are: α (bearing angle), β (downtilt angle), and γ (slant angle). | {α, β, γ} - resolution of {0.1} deg | 38.355 | Agreement Support both the case with and without translation of the LCS to GCS for SL-PRS based Azimuth of arrival (AoA) and zenith of arrival (ZoA) measurement. |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | sl-pos-arpID-Rx | Indicates ARP ID of an ARP used for reception for per-ARP measurement reporting. The ARP ID is used to uniquely identify an ARP associated with a UE. | INTEGER (1, …, [4]) |  | Agreement For per ARP measurement • The ARP ID of an ARP used for reception can be reported along with SL positioning measurement in measurement report.The ARP ID is used to uniquely identify an ARP associated with a UE • FFS: UE can indicate whether different ARPs for Rx and Tx are used for UE Rx-Tx time difference, if the UE optionally reports the Tx time information • FFS: ARP ID of an ARP used for transmission, and details if supported |
| NR\_pos\_enh2-Core | NR SL positioning Measurement Report | [locationTargetUe-sl-pos] (Up to RAN2) | Indicates location information of the target UE based on sidelink positioning measurements for UE-based SL positioning - reported at least to the LMF. | Up to RAN2 | 37.355, 38.355 (Up to RAN2) | Agreement Location information of the target UE based on sidelink positioning measurements can be reported at least to LMF. • FFS: on whether quality information of location is included, e.g., uncertainty etc • Up to other WGs to determine whether location information of the target UE can be reported to another UE • Up to RAN2 for signaling details • FFS: whether and how to report per ARP location information. |

The rapporteur notes that the parameters included above are quite similar to those already defined in LPP specification for Positioning measurement reporting. In particular, the *ProvideLocationInformation* IE contains the set of parameters that roughly correspond to the newly defined set of parameters above. Therefore, similar to the previous section, the most logical way to incorporate these parameters would be via SLPP *ProvideLocationInformation* msg, defined for each positioning method within SLPP.

**Q2-1: Do companies agree to defining new SLPP signaling for SL positioning measurement reporting, using the associated IE structure within *ProvideLocationInformation* IE in LPP as baseline, e.g. common information for location request as show in the TP of Annex 6?**

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon | Yes | For measurement reporting, it should be included in ProvideLocationInformation IE for sure.  But why the discussion above is related to location request??? |
| OPPO | Yes |  |
| vivo | Yes |  |
| ZTE | Yes | Yes for Method-A/B/C-ProvideLocationInformation |
| Xiaomi | Yes |  |
| Philips | Yes |  |
| CATT | Yes |  |
| Ericsson | Yes |  |
| Sony | Yes |  |
| Apple | Yes |  |
| Spreadtrum communications | Yes |  |
| CEWiT | Yes |  |
| Qualcomm | Yes |  |

It is also noteworthy that there are several parameters that are only relevant to a single positioning method (e.g. SL-RTT) while others may be applicable for all positioning methods. While RAN1 may provide this information to RAN2 in a future update, it would be useful to get company view on which parameters they think apply to all positioning method and so can be captured in the common part (i.e. *commonIEsProvideLocationInformation*) and which ones correspond to specific positioning methods and thus need to added to the corresponding Positioning Method IEs. Companies are invited to comment on the following grouping (labelled in red in the table below):

**Q2-2: Do companies agree to using the following grouping for SL positioning measurement reporting parameters in SLPP specification (noting that it can be revised if RAN1 has a different view)?**

|  |  |  |
| --- | --- | --- |
| **Parameter name in the spec** | **Description** | **Applicable positioning methods** |
| sl-losNlosIndicator | This parameter is used for UE to report LoS/NLoS information for UE measurements (including RSTD, RTOA, RSRP, RSRPP, AoA and UE Rx-Tx time difference) from UE to LMF or server UE.  The values correspond to the likelihood of LoS, with a value of 1 corresponding to LoS and a value of 0 corresponding to NLoS. | **Applicable POS methods: SL RSTD, SL RTOA, SL AoA, SL RTT** |
| sl-PRS-RSTD | SL-RSTD measurement based on first path of arrival | **Applicable POS methods: SL RSTD** |
| additionalPath-SL-PRS-RSTD | One or more additional detected path timing values for the Tx UE or SL PRS resource, relative to the path timing used for determining the SL-PRS-RSTD value | **Applicable POS methods: SL RSTD** |
| sl-PRS-RTOA | SL-RTOA measurement based on first path of arrival | **Applicable POS methods: SL RTOA** |
| additionalPath-SL-PRS-RTOA | One or more additional detected path timing values for the Tx UE or SL PRS resource, relative to the path timing used for determining the SL-PRS-RTOA value | **Applicable POS methods: SL RTOA** |
| sl-PRS-AoA | (SL-AoA, SL-ZoA) measurements based on first path of arrival | **Applicable POS methods: SL AoA** |
| additionalPath-SL-PRS-AoA | (SL-AoA, SL-ZoA) measurements based on additional paths | **Applicable POS methods: SL AoA** |
| sl-PRS-RxTxTimeDiff | SL Rx-Tx time difference measurement based on first path of arrival | **Applicable POS methods: SL RTT** |
| additionalPath-SL-PRS-Rx-Tx-TimeDiff | One or more additional detected path timing values for the target UE or SL PRS resource, relative to the path timing used for determining the SL-PRS-RxTxTimeDiff value | **Applicable POS methods: SL RTT** |
| sl-PRS-RSRP | SL-RSRP measurement | **Applicable POS methods: SL RSTD, [SL RTOA], [SL AoA], SL RTT** |
| sl-PRS-RSRPP | SL-RSRPP measurement based on first path of arrival | **Applicable POS methods: SL RSTD, [SL RTOA], [SL AoA], SL RTT** |
| additionalPath-SL-PRS-RSRPP | SL-RSRPP measurements based on additional paths | **Applicable POS methods: SL RSTD, [SL RTOA], [SL AoA], SL RTT** |
| sl-LCS-to-GCS-translation | A set of three angles which represent the translation from the local coordinate system (LCS) to the global coordinate system (GCS). The three angles are: α (bearing angle), β (downtilt angle), and γ (slant angle). | **Applicable POS methods: SL AoA** |
| sl-pos-arpID-Rx | Indicates ARP ID of an ARP used for reception for per-ARP measurement reporting. The ARP ID is used to uniquely identify an ARP associated with a UE. | **Applicable POS methods: All (SL RSTD/RTOA/AoA/RTT)** |
| [locationTargetUe-sl-pos] (Up to RAN2) | Indicates location information of the target UE based on sidelink positioning measurements for UE-based SL positioning - reported at least to the LMF. | **Applicable POS methods: UE-based SL POS methods (all: SL RSTD/RTOA/AoA/RTT)** |

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon | No | First a comment on the wording above, we do not think SL-RSTD and SL-RTOA are positioning method; they should only be the measurement for SL-TDOA.  To save the time to discuss the mapping between measurement and SL positioning methods, we could simply define a single measurement report that incorporates all the measurement that can be applicable for all the positioning methods, which significantly saves the time in the discussion of reporting signaling, as well as the UE capability signaling.  NOTE that for SLPP, we do not carry the burden of LTE LPP that we encountered during the NR LPP discussion. |
| OPPO | Yes | Except the SL-TDOA controversial issue, other grouping are Ok |
| vivo | No | Same view with Huawei that RAN2 can have unified report rather than per method report. |
| ZTE | Yes | This grouping is ok to us (except separating SL-RTOA and SL-RSTD) |
| Xiaomi | Yes |  |
| CATT | No | Same view as Huawei. |
| Ericsson | Yes |  |
| Apple | No | Agree with Huawei, we can do it cleaner in SLPP – don’t have to carry on LPP legacy |
| Spreadtrum communications | Yes | Except splitting SL-RTOA and SL-RSTD, other grouping is ok. |
| Qualcomm | Yes |  |

Based on RAN1 agreements, only SL-TDOA, SL-AoA and SL-RTT are supported in Rel-18. For SL-TDOA, there are SL-RSTD and SL-RTOA measurements. If we follow legacy positioning approach, SL-RSTD and SL-RTOA should be defined as different positioning methods within SLPP.

**Q2-3: Do companies agree to define SL-RSTD and SL-RTOA as separate positioning methods?**

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon |  | SL RSTD is the measurement for a DL-like SL-TDOA positioning method, while SL RTOA is the measurement for a UL-like SL-TDOA positioning method. While RAN1 has already agreed on the positioning methods, RAN2 does to discuss whether to define new positioning methods.  C:\Users\y00397895\AppData\Roaming\eSpace_Desktop\UserData\y00397895\imagefiles\F5A88D6E-1D33-4277-B01A-2406141F87BC.png  SL RSTD and SL RTOA are measurements, instead of methods. If different methods are introduced, it should be DL-LikeSL-TDOA and UL-LikeSL-TDOA. We do not see much need to differentiate these two.  Again, a single SL positioning measurement report can save the time for the discussion, which is different from Uu in Rel-16. |
| OPPO |  | We agree with Huawei that SL-RSTD and SL-RTOA should be regarded as two separate positioning measurement results. Instead of including sl-PRS-RSTD and sl-PRS-RTOA in different method-specific measurement report, they could be included in the same method-specific measurement report, such as SL-TDOA. Only one of them should be present in the measurement report simultaneously. |
| vivo | No | Agree with HW. Besides, it is a single positioning method in RAN1, i.e., SL-TDOA, and RAN2 is better to follow the view. |
| ZTE | No | They are two kinds of measurements for a same positioning method, not two methods. |
| Xiaomi | No |  |
| Philips | No | We agree with Huawei |
| CATT | No | They both belong to SL-TDOA (UL-like TDOA/DL-like TDOA) |
| Ericsson |  | Though SL RSTD and SL RTOA are different measurements, setting them as separate methods is more clear and neater to configure the TX/RX for the UEs in a SLPP session. |
| Sony | No |  |
| Apple | See comments | Agree with Huawei these are measurements and not methods, but in the light of the answers to the previous question does it even matter? Let’s define a common measurement and save outselves the trouble of the discussion on this question. |
| Spreadtrum communications | No |  |
| Qualcomm | Yes | The procedures are different.  For example, SL-RSTD measurements are made at the Rx UE from multiple Tx UEs. There should be no e.g., SLPP-Request Location Information for the Tx UEs needed.  SL-rTOA measurements are made at multiple Rx UEs and reported to the Tx UE. |

Based on the classification in Q2-2, the SLPP TP on measurement reporting is provided in Annex 6. Companies are invited to provide comments/suggestions if any.

**Q2-3: Any comments on the SLPP TP in Annex 6 of measurement reporting:**

|  |  |
| --- | --- |
| **Company’s name** | **Comments, if any** |
| Huawei, HiSilicon | 1/ The following IEs could be put under common IEs.  LOS-NLOS-Indicator  LCS-GCS-Translation  AdditionalPathList  For LCS-GCS-Translation, it should be a common set of {alpha, beta, gamma}, which applies to both AoA and ZoA.  2/ On *CommonIEsRequestLocationInformation* and *CommonIEsProvideLocationInformation*, that part was initially intended for common signalings across positioning method, as well as UE location reporting to the server to the case of UE-based positioning.  We could prefer not to capture the UE location related information in SLPP, including absolute position and velocity. The reasons are   1. For the location transfer between UE and LMF, the existing LPP should be used, which can take all the existing Uu positioning and GNSS positioning into account. 2. For the location transfer between UE and serve UE, we do not think it is supported for a server UE to further retrieve location from the target UE that is doing UE-based positioning.   3/ on triggeredReporting TriggeredReportingCriteria OPTIONAL,  periodicalReporting PeriodicalReportingCriteria OPTIONAL, we think this needs further discussion what are the requirement for this in the SLPP spec, although we understand similar fields also exist in the LPP spec. Similarly, for the field “environment”, not quite sure if it is still applicable for SL positioning  4/ field descriptions for the fields under CommonIEsProvideLocationInformation are still empty  5/within the R4 LS to R2 R4-2314358, the following agreements have been made on the RSRP/SL-AoA/CPP reporting. These can be implemented within SLPP   |  | | --- | | **For SL positioning measurements:**   * Report mappings for SL-RSRP and SL-RSRPP are the same as for PRS-RSRP and PRS-RSRPP respectively. * Reporting mappings for SL-A-AoA and SL-Z-AoA are the same as for UL A-AoA and UL Z-AoA respectively. * The report mappings for SL-UE-Rx-Tx, SL-RTOA and SL-RSTD are FFS.   **For CPP measurements:**   * For DL RSCP measurements, the reporting range is [0, 360) degrees and the reporting granularity is 0.1 degree. * For DL RSCPD measurements, the reporting range is [-180, 180) degrees and the reporting granularity is 0.1 degree. | |
| vivo | The following semicolon should be removed.  FROM  SLPP-PDU-Method-SL-RTOA-Contents; |
| ZTE | We are wondering whether the location estimate for ranging should be supported, since the location estimate for ranging can be derived by SL-RTT method.  For absolute positioning, the location estimate is captured in CommonIEsProvideLocationInformation; however for ranging, the format of the location estimate should be different? For example, UE A should report the distance/deviation angle between UE A and UE B, the unit is meter/angle. |
| Xiaomi | For CommonIEsProvideLocationInformation, the following IEs should also be added for ranging:  rangeEstimate Range OPTIONAL,  azimuthEstimate Azimuth OPTIONAL,  elevationEstimate Elevation OPTIONAL,  For LocationCoordinates, the following choice should also be added for ranging:  rangeAndDirection RangeAndDirection,  RangeAndDirection ::= Sequence {  range Range OPTIONAL,  azimuth Azimuth OPTIONAL,  elevation Elevation OPTIONAL,  }  Range ::= Sequence {  range INTEGER (0..50000),  uncertainty INTEGER (0..127),  confidence INTEGER (0..100) OPTIONAL,  }  Azimuth ::= Sequence {  azimuth INTEGER (0..359),  uncertainty INTEGER (0..127),  confidence INTEGER (0..100) OPTIONAL,  }  Elevation ::= Sequence {  elevation INTEGER (0..179),  uncertainty INTEGER (0..63),  confidence INTEGER (0..100) OPTIONAL,  }  For *CommonIEsRequestLocationInformation* :  The triggering condition needs further discussion.  TriggeredReportingCriteria ::= SEQUENCE {  reportingDuration ReportingDuration,  ...  }  QoS IE forget to include ranging related parameters:  QoS ::= SEQUENCE {  horizontalAccuracy HorizontalAccuracy OPTIONAL,  verticalCoordinateRequest BOOLEAN,  verticalAccuracy VerticalAccuracy OPTIONAL,  responseTime ResponseTime OPTIONAL,  velocityRequest BOOLEAN,  rangeAccuracy RangeAccuracy OPTIONAL, -- Need M  azimuthAccuracy AzimuthAccuracy OPTIONAL, -- Need M  elevationAccuracy ElevationAccuracy OPTIONAL, -- Need M  ...  }  RangeAccuracy ::= SEQUENCE {  accuracy INTEGER(0..127),  confidence INTEGER(0..100),  ...  }  AzimuthAccuracy ::= SEQUENCE {  accuracy INTEGER(0..127),  confidence INTEGER(0..100),  ...  }  ElevationAccuracy ::= SEQUENCE {  accuracy INTEGER(0..127),  confidence INTEGER(0..100),  ...  }  Also, for ranging, reference direction may need to be configured for direction measurement:  referencedirection ReferenceDirection OPTIONAL, -- Need M |
| Philips | Question number should be Q2-4. |

### 2.3 Other parameters

Finally, additional new parameters within the RAN1 provided list not covered in the previous sections are indicated below [1]:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **Parameter name in the spec** | **Description** | **Value range** | **Specification** | **Comment** |
| NR\_pos\_enh2-Core | NR SL Measurement Report | anchorUE-location-Information | Anchor UE location information to LMF or UE | TBD | Up to RAN2 | Agreement For provision of assistance information for absolute SL positioning, the anchor UE location information can be provided to LMF or UE. FFS: which UEs can receive the anchor UE location information (note: which may be decided by other WGs) FFS on quality information of anchor UE location information. |
| NR\_pos\_enh2-Core | NR SL positioning Assistance Information | expected-SL-AoA-and-Uncertainty | Indicates expected SL AoA and uncertainty range to a measuring UE | Ref. 38.455 | 38.355 | Agreement For provision of assistance information for SL AoA measurement, expected SL-AoA value and uncertainty range can be provided to measuring UE. • No specification impact on how to set the uncertainty range • From RAN1 perspective, no performance requirements are expected to be defined for the uncertainty range in Rel-18 |

Regarding the first parameter, since how to capture is left to RAN2, it would be good to get company views on when the location information about the anchor UE is provided to the LMF or UE. Firstly, rapporteur assumes that for Network based operation, this information needs to be provided to the LMF to calculate absolute position. Similarly, for the case of UE-only operation, this information needs to be provided to the server UE instead. Companies are invited to confirm this understanding.

**Q3-1: Do companies agree that for the case of absolute SL positioning, the following can be said about the anchor UE absolute location:**

* **For Network based operation (UE assisted), the anchor UE location shall be provided to the LMF for absolute SL positioning**
* **For Network based operation (UE based), the anchor UE location shall be provided to the UE for absolute SL positioning**
* **For UE only operation, the anchor UE location shall be provided to the server UE**

1. **Yes**
2. **No (provide comments)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon | Yes | This to our understanding is similar to the NRPPa procedure on TRP location information exchange. It is unlike traditional LPP counterparts in the assistance data transfer direction.  In general, we think it should be provided to the LMF/server UE.  We could define the assistance data transfer as bi-directional, which can be either from a server to a UE or from a UE to a server. |
| OPPO | Partly yes | We wonder why the UE-based position calculation is missed from the UE only operation? In such cases the anchor UE location shall be provided to the target UE. |
| vivo | Yes |  |
| ZTE | Yes | Server UE can be target UE or another UE. So to the server UE is correct |
| Xiaomi | Yes |  |
| Philips | Yes, with comments | Yes, for the general principle, but for Network assisted operation (i.e. UE-based calculation), whether or not the anchor UE location can always be provided to the target UE may require input from other WGs, for example SA3 for privacy requirements. Similarly, for providing the anchor UE location to the server UE, input from SA3 and possibly other WGs may be required. |
| CATT | Yes |  |
| Ericsson | Yes |  |
| Sony | Yes |  |
| Apple | No | We are not convinced this is a) needed and b) can be completed in time. If we are to do it, we’d agree with OPPO that there is also the case when it needs to be provided to the target UE. Additionally, this must be an optional feature - in our view, very few UEs would be willing to provide this information anyway. In fact, since there is no incentive whatsoever for a UE to provide such information, an anchor UE must be a special UE deployed perhaps by an operator, in which case their locations must be known already. |
| Spreadtrum communications | Yes |  |
| CEWiT | Yes |  |
| Qualcomm | Yes | However, we expect that anchor UE location will only be provided on request. |

Furthermore, how this information is provided needs to be discussed. This is also related to Q1-6, i.e. whether we need to specify how the server get the SL-PRS configuration from the Tx UE (based on option 2 of Q1-6, the server gets the information from Tx UE directly and forward it to UE for UE based positioning)? Or the server get the information from target UE directly (based on Option 1 of Q1-6, the target UE can get the information from Tx UE directly, and then forward it to server).

**Q3-2: What is companies’ view on how the *anchorUE-location-Information* of Tx UE is obtained by the server or target UE (UE based positioning):**

1. **Target UE gets the** **anchorUE-location-Information of Tx UE via SLPP message *ProvideAssistanceData,* and then provide it as part of the Location Information transfer procedure, i.e. target can include this as part of the *ProvideLocationInformation* message**
2. **Server gets the anchorUE-location-Information of Tx UE via SLPP message (NRPPa similar procedure) and then forwards it to the target UE (for UE based positioning) via SLPP message *ProvideAssistanceData***
3. **Other (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Option** | **Comments, if any** |
| Huawei, HiSilicon | 2) | We prefer to take the legacy approach. It should be noted that the server UE here can also collocate with the target UE |
| OPPO | 2) |  |
| vivo | 2) |  |
| ZTE | 2) | In 2) the first message should be SLPP message ProvideAssistanceData, not a newly defined message |
| Xiaomi | See comment | As we have model SLPP as between two endpoints, it enables any UE to provide the location information to any other UE. So, the spec is flexible enough to accomodate any implementations. |
| Philips | 2), with comments | Similar to the LMF, the server UE can receive information about discovered anchor UEs from the Target UE (or it can discover anchor UEs by itself), and hence the server UE can contact the respective Anchor UEs (i.e. Tx UEs) via SLPP message to get the anchor UE location information. Whether or not it forwards the respective anchor UE location to the target UE, depends on whether or not the server UE is responsible for calculating the position of the Target UE, or the Target UE itself. It also depends on e.g., privacy aspects, that may need input from other WGs, such as SA3.  Option 1 does not make much sense since the information is provided in an indirect manner, and may have additional privacy issues (e.g., an Anchor UE may be willing to share its location with an authorized SL positioning server UE but may not be willing to do so with every Target UE. |
| CATT | 2 but | But one question on solution 2: what about the case without server UE? Can we assume that there is always a server UE in SLPP session? |
| Ericsson | 2 |  |
| Sony | 2 |  |
| Apple | 3 | We think in this release we can either assume that the target UE and the server UE are the same or leave the information exchange between them to implementation |
| Spreadtrum communications | 2 |  |
| CEWiT | 2 |  |
| Qualcomm | 3) | SLPP Request/Provide Location Information (e.g., just the common IEs) can be used to request and obtain anchor UE location. Note that an anchor UE could be an Rx UE as well as or instead of a Tx UE. |

For second parameter *expected-SL-AoA-and-Uncertainty*, it can be provided in Method-SL-AoA-ProvideAssistanceData.

**Q3-3: Do companies agree to capture “expected-SL-AoA-and-Uncertainty” in Method-SL-AoA-ProvideAssistanceData?**

1. **Yes**
2. **No (please comment)**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Comments, if any** |
| Huawei, HiSilicon | Yes | Similar to expected DL AoA already captured in LPP. |
| OPPO | Yes |  |
| vivo | Yes |  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Philips | Yes |  |
| CATT | Yes |  |
| Ericsson | Yes |  |
| Apple | Yes |  |
| Spreadtrum communications | Yes |  |
| Qualcomm | Yes | This also shows that there will be SL-PRS common assistance data and SL-method specific assistance data (see our response to Q1-7). |

The SLPP TP on expected-SL-AoA-and-Uncertainty is provided in Annex 6, companies are invited to provide comments/suggestions if any.

**Q3-4: Any comments on the SLPP TP in Annex6 “Method-SL-AoA-ProvideAssistanceData” of expected-SL-AoA-and-Uncertainty:**

|  |  |
| --- | --- |
| **Company’s name** | **Comments, if any** |
| Qualcomm | We think the SL-PRS-Config should be in a *Common-SL-PRS-MethodsIEsProvideAssistanceData* and not repeated in each *method-ProviodeAssistanceData*  (see also our response to Q1-7). |
|  |  |
|  |  |

### 2.4 Other issues

|  |  |
| --- | --- |
| **Company’s name** | **Other issues** |
|  |  |
|  |  |
|  |  |

# Summary/Conclusion

# References

|  |  |
| --- | --- |
| [1] | R1-2308674, LS on Rel-18 higher-layer parameter list, RAN1. |
| [2] | TS 38.331, NR; Radio Resource Control (RRC) Specification. |

# Annex: RRC TP for SL-PRS related parameters

Start of Change

– *SL-BWP-Config*

The IE *SL-BWP-Config* is used to configure the UE specific NR sidelink communication on one particular sidelink bandwidth part.

***SL-BWP-Config* information element**

-- ASN1START

-- TAG-SL-BWP-CONFIG-START

SL-BWP-Config-r16 ::= SEQUENCE {

sl-BWP-Id BWP-Id,

sl-BWP-Generic-r16 SL-BWP-Generic-r16 OPTIONAL, -- Need M

sl-BWP-PoolConfig-r16 SL-BWP-PoolConfig-r16 OPTIONAL, -- Need M

...,

[[

sl-BWP-PoolConfigPS-r17 SetupRelease {SL-BWP-PoolConfig-r16} OPTIONAL, -- Need M

sl-BWP-DiscPoolConfig-r17 SetupRelease {SL-BWP-DiscPoolConfig-r17} OPTIONAL -- Need M

]],

[[

sl-BWP-PRSPoolConfig-r18 SetupRelease {SL-BWP-PRSPoolConfig-r18} OPTIONAL -- Need M

]]

}

SL-BWP-Generic-r16 ::= SEQUENCE {

sl-BWP-r16 BWP OPTIONAL, -- Need M

sl-LengthSymbols-r16 ENUMERATED {sym7, sym8, sym9, sym10, sym11, sym12, sym13, sym14} OPTIONAL, -- Need M

sl-StartSymbol-r16 ENUMERATED {sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7} OPTIONAL, -- Need M

sl-PSBCH-Config-r16 SetupRelease {SL-PSBCH-Config-r16} OPTIONAL, -- Need M

sl-TxDirectCurrentLocation-r16 INTEGER (0..3301) OPTIONAL, -- Need M

...

}

-- TAG-SL-BWP-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-BWP-Config* field descriptions** |
| ***sl-BWP-DiscPoolConfig***  This field indicates the NR sidelink discovery dedicated resource pool configurations on the configured sidelink BWP. The total number of Rx/Tx resource pools configured for communication and discovery does not exceed the maximum number of Rx/Tx resource pool for NR sidelink communication (i.e. *maxNrofRXPool-r16/maxNrofTXPool-r16*). |
| ***sl-BWP-Generic***  This field indicates the generic parameters on the configured sidelink BWP. |
| ***sl-BWP-PoolConfig***  This field indicates the resource pool configurations on the configured sidelink BWP. |
| ***sl-BWP-Id***  An identifier for this sidelink bandwidth part. |
| ***sl-BWP-PoolConfigPS***  This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include *sl-TxPoolExceptional*. |
| ***sl-BWP-PRSPoolConfig***  This field indicates the resource pool configurations for SL-PRS on the configured sidelink BWP. This field does not include *sl-TxPoolExceptional*. |

|  |
| --- |
| ***SL-BWP-Generic* field descriptions** |
| ***sl-LengthSymbols***  This field indicates the number of symbols used for sidelink in a slot without S-SSB. A single value can be (pre)configured per sidelink bandwidth part. |
| ***sl-StartSymbol***  This field indicates the starting symbol used for sidelink in a slot without S-SSB. A single value can be (pre)configured per sidelink bandwidth part. |
| ***sl-TxDirectCurrentLocation***  The sidelink Tx/Rx Direct Current location for the carrier. Only values in the value range of this field between 0 and 3299, which indicate the subcarrier index within the carrier corresponding to the numerology of the corresponding sidelink BWP and value 3300, which indicates "Outside the carrier" and value 3301, which indicates "Undetermined position within the carrier" are used in this version of the specification. |

– *SL-BWP-ConfigCommon*

The IE *SL-BWP-ConfigCommon* is used to configure the cell-specific configuration information on one particular sidelink bandwidth part.

***SL-BWP-ConfigCommon* information element**

-- ASN1START

-- TAG-SL-BWP-CONFIGCOMMON-START

SL-BWP-ConfigCommon-r16 ::= SEQUENCE {

sl-BWP-Generic-r16 SL-BWP-Generic-r16 OPTIONAL, -- Need R

sl-BWP-PoolConfigCommon-r16 SL-BWP-PoolConfigCommon-r16 OPTIONAL, -- Need R

...,

[[

sl-BWP-PoolConfigCommonPS-r17 SL-BWP-PoolConfigCommon-r16 OPTIONAL, -- Need R

sl-BWP-DiscPoolConfigCommon-r17 SL-BWP-DiscPoolConfigCommon-r17 OPTIONAL -- Need R

]],

[[

sl-BWP-PRSPoolConfigCommon-r18 SL-BWP-PRSPoolConfig-r18 OPTIONAL -- Need R

]]

}

-- TAG-SL-BWP-CONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-BWP-ConfigCommon* field descriptions** |
| ***sl-BWP-DiscPoolConfigCommon***  This field indicates the NR sidelink discovery dedicated resource pool configurations on the configured sidelink BWP. The total number of Rx/Tx resource pools configured for communication and discovery does not exceed the maximum number of Rx/Tx resource pool for NR sidelink communication (i.e. *maxNrofRXPool-r16/maxNrofTXPool-r16*). |
| ***sl-BWP-Generic***  This field indicates the generic parameters on the configured sidelink BWP. |
| ***sl-BWP-PoolConfigCommon***  This field indicates the resource pool configurations on the configured sidelink BWP. |
| ***sl-BWP-PoolConfigCommonPS***  This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include *sl-TxPoolExceptional*. |
| ***sl-BWP-PRSPoolConfigCommon***  This field indicates the resource pool configurations for SL-PRS on the configured sidelink BWP. This field does not include *sl-TxPoolExceptional*. |

– *SL-BWP-DiscPoolConfig*

The IE *SL-BWP-DiscPoolConfig* is used to configure UE specific NR sidelink discovery dedicated resource pool.

***SL-BWP-DiscPoolConfig* information element**

-- ASN1START

-- TAG-SL-BWP-DISCPOOLCONFIG-START

SL-BWP-DiscPoolConfig-r17 ::= SEQUENCE {

sl-DiscRxPool-r17 SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16 OPTIONAL, -- Cond HO

sl-DiscTxPoolSelected-r17 SL-TxPoolDedicated-r16 OPTIONAL, -- Need M

sl-DiscTxPoolScheduling-r17 SL-TxPoolDedicated-r16 OPTIONAL -- Need N

}

-- TAG-SL-BWP-DISCPOOLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-BWP-DiscPoolConfig* field descriptions** |
| ***sl-DiscTxPoolScheduling***  Indicates the resources by which the UE is allowed to transmit NR sidelink discover based on network scheduling on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.  When this field is configured together with *sl-TxPoolScheduling*, the resource pool index (which is used in DCI Format 3\_0 in TS 38.212 [17], clause 7.3.1.4.1) is defined as 0, 1, …, x-1 for the resource pools included in the *sl-TxPoolScheduling*, and x, x+1, …, x+y-1 for the resource pools included in *sl-DiscTxPoolScheduling*, where x is the number of the resource pools in *sl-TxPoolScheduling*, and y is the number of resource pools in *sl-DiscTxPoolScheduling*. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *HO* | This field is optionally present, need M, in an *RRCReconfiguration* message including *reconfigurationWithSync*; otherwise it is absent, need M. |

– *SL-BWP-DiscPoolConfigCommon*

The IE *SL-BWP-DiscPoolConfigCommon* is used to configure the cell-specific NR sidelink discovery dedicated resource pool.

***SL-BWP-DiscPoolConfigCommon* information element**

-- ASN1START

-- TAG-SL-BWP-DISCPOOLCONFIGCOMMON-START

SL-BWP-DiscPoolConfigCommon-r17 ::= SEQUENCE {

sl-DiscRxPool-r17 SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16 OPTIONAL, -- Need R

sl-DiscTxPoolSelected-r17 SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16 OPTIONAL, -- Need R

...

}

-- TAG-SL-BWP-DISCPOOLCONFIGCOMMON-STOP

-- ASN1STOP

– *SL-BWP-PRSPoolConfig*

The IE *SL-BWP-PRSPoolConfig* is used to configure UE specific NR sidelink PRS dedicated resource pool.

***SL-BWP-PRSPoolConfig* information element**

-- ASN1START

-- TAG-SL-BWP-PRSPOOLCONFIG-START

SL-BWP-PRSPoolConfig-r18 ::= SEQUENCE {

sl-PRSRxPool-r18 SEQUENCE (SIZE (1..TBD)) OF SL-ResourcePool-r16 OPTIONAL, -- Cond HO

sl-PRSTxPoolSelected-r18 SL-TxPoolDedicated-r16 OPTIONAL, -- Need M

sl-PRSTxPoolScheduling-r18 SL-TxPoolDedicated-r16 OPTIONAL -- Need N

}

-- TAG-SL-BWP-PRSPOOLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SL-BWP-PRSPoolConfig* field descriptions** |
| ***sl-PRSTxPoolSelected***  Indicates the resources by which the UE is allowed to perform sidelink PRS transmission by UE autonomous resource selection on the configured BWP. |
| ***sl-PRSTxPoolScheduling***  Indicates the resources by which the UE is allowed to perform sidelink PRS transmission based on network selection on the configured BWP. |

– *SL-BWP-PRSPoolConfigCommon*

The IE *SL-BWP-PRSPoolConfigCommon* is used to configure the cell-specific NR sidelink PRS dedicated resource pool.

***SL-BWP-PRSPoolConfigCommon* information element**

-- ASN1START

-- TAG-SL-BWP-PRSPOOLCONFIGCOMMON-START

SL-BWP-PRSPoolConfigCommon-r17 ::= SEQUENCE {

sl-PRSRxPool-r17 SEQUENCE (SIZE (1..TBD)) OF SL-ResourcePool-r16 OPTIONAL, -- Need R

sl-PRSTxPoolSelected-r17 SEQUENCE (SIZE (1..TBD)) OF SL-ResourcePoolConfig-r16 OPTIONAL, -- Need R

...

}

-- TAG-SL-BWP-PRSPOOLCONFIGCOMMON-STOP

-- ASN1STOP

– *SL-ResourcePool*

The IE *SL-ResourcePool* specifies the configuration information for NR sidelink communication resource pool.

***SL-ResourcePool* information element**

-- ASN1START

-- TAG-SL-RESOURCEPOOL-START

SL-ResourcePool-r16 ::= SEQUENCE {

sl-PSCCH-Config-r16 SetupRelease { SL-PSCCH-Config-r16 } OPTIONAL, -- Need M

sl-PSSCH-Config-r16 SetupRelease { SL-PSSCH-Config-r16 } OPTIONAL, -- Need M

sl-PSFCH-Config-r16 SetupRelease { SL-PSFCH-Config-r16 } OPTIONAL, -- Need M

sl-SyncAllowed-r16 SL-SyncAllowed-r16 OPTIONAL, -- Need M

sl-SubchannelSize-r16 ENUMERATED {n10, n12, n15, n20, n25, n50, n75, n100} OPTIONAL, -- Need M

dummy INTEGER (10..160) OPTIONAL, -- Need M

sl-StartRB-Subchannel-r16 INTEGER (0..265) OPTIONAL, -- Need M

sl-NumSubchannel-r16 INTEGER (1..27) OPTIONAL, -- Need M

sl-Additional-MCS-Table-r16 ENUMERATED {qam256, qam64LowSE, qam256-qam64LowSE } OPTIONAL, -- Need M

sl-ThreshS-RSSI-CBR-r16 INTEGER (0..45) OPTIONAL, -- Need M

sl-TimeWindowSizeCBR-r16 ENUMERATED {ms100, slot100} OPTIONAL, -- Need M

sl-TimeWindowSizeCR-r16 ENUMERATED {ms1000, slot1000} OPTIONAL, -- Need M

sl-PTRS-Config-r16 SL-PTRS-Config-r16 OPTIONAL, -- Need M

sl-UE-SelectedConfigRP-r16 SL-UE-SelectedConfigRP-r16 OPTIONAL, -- Need M

sl-RxParametersNcell-r16 SEQUENCE {

sl-TDD-Configuration-r16 TDD-UL-DL-ConfigCommon OPTIONAL, -- Need M

sl-SyncConfigIndex-r16 INTEGER (0..15)

} OPTIONAL, -- Need M

sl-ZoneConfigMCR-List-r16 SEQUENCE (SIZE (16)) OF SL-ZoneConfigMCR-r16 OPTIONAL, -- Need M

sl-FilterCoefficient-r16 FilterCoefficient OPTIONAL, -- Need M

sl-RB-Number-r16 INTEGER (10..275) OPTIONAL, -- Need M

sl-PreemptionEnable-r16 ENUMERATED {enabled, pl1, pl2, pl3, pl4, pl5, pl6, pl7, pl8} OPTIONAL, -- Need R

sl-PriorityThreshold-UL-URLLC-r16 INTEGER (1..9) OPTIONAL, -- Need M

sl-PriorityThreshold-r16 INTEGER (1..9) OPTIONAL, -- Need M

sl-X-Overhead-r16 ENUMERATED {n0,n3, n6, n9} OPTIONAL, -- Need S

sl-PowerControl-r16 SL-PowerControl-r16 OPTIONAL, -- Need M

sl-TxPercentageList-r16 SL-TxPercentageList-r16 OPTIONAL, -- Need M

sl-MinMaxMCS-List-r16 SL-MinMaxMCS-List-r16 OPTIONAL, -- Need M

...,

[[

sl-TimeResource-r16 BIT STRING (SIZE (10..160)) OPTIONAL -- Need M

]],

[[

sl-PBPS-CPS-Config-r17 SetupRelease { SL-PBPS-CPS-Config-r17 } OPTIONAL, -- Need M

sl-InterUE-CoordinationConfig-r17 SetupRelease { SL-InterUE-CoordinationConfig-r17 } OPTIONAL -- Need M

]]

}

SL-ZoneConfigMCR-r16 ::= SEQUENCE {

sl-ZoneConfigMCR-Index-r16 INTEGER (0..15),

sl-TransRange-r16 ENUMERATED {m20, m50, m80, m100, m120, m150, m180, m200, m220, m250, m270, m300, m350,

m370, m400, m420, m450, m480, m500, m550, m600, m700, m1000, spare9, spare8,

spare7, spare6, spare5, spare4, spare3, spare2, spare1}

OPTIONAL, -- Need M

sl-ZoneConfig-r16 SL-ZoneConfig-r16 OPTIONAL, -- Need M

...

}

SL-SyncAllowed-r16 ::= SEQUENCE {

gnss-Sync-r16 ENUMERATED {true} OPTIONAL, -- Need R

gnbEnb-Sync-r16 ENUMERATED {true} OPTIONAL, -- Need R

ue-Sync-r16 ENUMERATED {true} OPTIONAL -- Need R

}

SL-PSCCH-Config-r16 ::= SEQUENCE {

sl-TimeResourcePSCCH-r16 ENUMERATED {n2, n3} OPTIONAL, -- Need M

sl-FreqResourcePSCCH-r16 ENUMERATED {n10,n12, n15, n20, n25} OPTIONAL, -- Need M

sl-DMRS-ScrambleID-r16 INTEGER (0..65535) OPTIONAL, -- Need M

sl-NumReservedBits-r16 INTEGER (2..4) OPTIONAL, -- Need M

...

}

SL-PSSCH-Config-r16 ::= SEQUENCE {

sl-PSSCH-DMRS-TimePatternList-r16 SEQUENCE (SIZE (1..3)) OF INTEGER (2..4) OPTIONAL, -- Need M

sl-BetaOffsets2ndSCI-r16 SEQUENCE (SIZE (4)) OF SL-BetaOffsets-r16 OPTIONAL, -- Need M

sl-Scaling-r16 ENUMERATED {f0p5, f0p65, f0p8, f1} OPTIONAL, -- Need M

...

}

SL-PSFCH-Config-r16 ::= SEQUENCE {

sl-PSFCH-Period-r16 ENUMERATED {sl0, sl1, sl2, sl4} OPTIONAL, -- Need M

sl-PSFCH-RB-Set-r16 BIT STRING (SIZE (10..275)) OPTIONAL, -- Need M

sl-NumMuxCS-Pair-r16 ENUMERATED {n1, n2, n3, n6} OPTIONAL, -- Need M

sl-MinTimeGapPSFCH-r16 ENUMERATED {sl2, sl3} OPTIONAL, -- Need M

sl-PSFCH-HopID-r16 INTEGER (0..1023) OPTIONAL, -- Need M

sl-PSFCH-CandidateResourceType-r16 ENUMERATED {startSubCH, allocSubCH} OPTIONAL, -- Need M

...

}

SL-PTRS-Config-r16 ::= SEQUENCE {

sl-PTRS-FreqDensity-r16 SEQUENCE (SIZE (2)) OF INTEGER (1..276) OPTIONAL, -- Need M

sl-PTRS-TimeDensity-r16 SEQUENCE (SIZE (3)) OF INTEGER (0..29) OPTIONAL, -- Need M

sl-PTRS-RE-Offset-r16 ENUMERATED {offset01, offset10, offset11} OPTIONAL, -- Need M

...

}

SL-UE-SelectedConfigRP-r16 ::= SEQUENCE {

sl-CBR-PriorityTxConfigList-r16 SL-CBR-PriorityTxConfigList-r16 OPTIONAL, -- Need M

sl-Thres-RSRP-List-r16 SL-Thres-RSRP-List-r16 OPTIONAL, -- Need M

sl-MultiReserveResource-r16 ENUMERATED {enabled} OPTIONAL, -- Need M

sl-MaxNumPerReserve-r16 ENUMERATED {n2, n3} OPTIONAL, -- Need M

sl-SensingWindow-r16 ENUMERATED {ms100, ms1100} OPTIONAL, -- Need M

sl-SelectionWindowList-r16 SL-SelectionWindowList-r16 OPTIONAL, -- Need M

sl-ResourceReservePeriodList-r16 SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 OPTIONAL, -- Need M

sl-RS-ForSensing-r16 ENUMERATED {pscch, pssch},

...,

[[

sl-CBR-PriorityTxConfigList-v1650 SL-CBR-PriorityTxConfigList-v1650 OPTIONAL -- Need M

]]

}

SL-ResourceReservePeriod-r16 ::= CHOICE {

sl-ResourceReservePeriod1-r16 ENUMERATED {ms0, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},

sl-ResourceReservePeriod2-r16 INTEGER (1..99)

}

SL-SelectionWindowList-r16 ::= SEQUENCE (SIZE (8)) OF SL-SelectionWindowConfig-r16

SL-SelectionWindowConfig-r16 ::= SEQUENCE {

sl-Priority-r16 INTEGER (1..8),

sl-SelectionWindow-r16 ENUMERATED {n1, n5, n10, n20}

}

SL-TxPercentageList-r16 ::= SEQUENCE (SIZE (8)) OF SL-TxPercentageConfig-r16

SL-TxPercentageConfig-r16 ::= SEQUENCE {

sl-Priority-r16 INTEGER (1..8),

sl-TxPercentage-r16 ENUMERATED {p20, p35, p50}

}

SL-MinMaxMCS-List-r16 ::= SEQUENCE (SIZE (1..3)) OF SL-MinMaxMCS-Config-r16

SL-MinMaxMCS-Config-r16 ::= SEQUENCE {

sl-MCS-Table-r16 ENUMERATED {qam64, qam256, qam64LowSE},

sl-MinMCS-PSSCH-r16 INTEGER (0..27),

sl-MaxMCS-PSSCH-r16 INTEGER (0..31)

}

SL-BetaOffsets-r16 ::= INTEGER (0..31)

SL-PowerControl-r16 ::= SEQUENCE {

sl-MaxTransPower-r16 INTEGER (-30..33),

sl-Alpha-PSSCH-PSCCH-r16 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M

dl-Alpha-PSSCH-PSCCH-r16 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need S

sl-P0-PSSCH-PSCCH-r16 INTEGER (-16..15) OPTIONAL, -- Need S

dl-P0-PSSCH-PSCCH-r16 INTEGER (-16..15) OPTIONAL, -- Need M

dl-Alpha-PSFCH-r16 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need S

dl-P0-PSFCH-r16 INTEGER (-16..15) OPTIONAL, -- Need M

...,

[[

dl-P0-PSSCH-PSCCH-r17 INTEGER (-202..24) OPTIONAL, -- Need M

sl-P0-PSSCH-PSCCH-r17 INTEGER (-202..24) OPTIONAL, -- Need S

dl-P0-PSFCH-r17 INTEGER (-202..24) OPTIONAL -- Need M

]]

}

-- TAG-SL-RESOURCEPOOL-STOP

-- ASN1STOP

| ***SL-ZoneConfigMCR* field descriptions** |
| --- |
| ***sl-TransRange***  Indicates the communication range requirement for the corresponding *sl-ZoneConfigMCR-Index*. The unit is meter. |
| ***sl-ZoneConfig***  Indicates the zone configuration for the corresponding *sl-ZoneConfigMCR-Index*. |
| ***sl-ZoneConfigMCR-Index***  Indicates the codepoint of the communication range requirement field in SCI. |

|  |
| --- |
| ***SL-ResourcePool* field descriptions** |
| ***dummy***  This field is not used in the specification. If received it shall be ignored by the UE. |
| ***sl-Additional-MCS-Table***  Indicates the MCS table(s) additionally used in the resource pool. 64QAM table is (pre-)configured as default. Zero, one or two can be additionally (pre-)configured using the 256QAM and/or low-SE MCS tables. If two MCS tables are indicated, 256QAM MCS table is the 1st table and qam64lowSE MCS table is the 2nd table as specified in TS 38.214 [19], clause 8.1.3.1. |
| ***sl-FilterCoefficient***  This field indicates the filtering coefficient for long-term measurement and reference signal power derivation used for sidelink open-loop power control. |
| ***sl-InterUE-CoordinationConfig***  Indicates the configured sidelink inter-UE coordination parameters. |
| ***sl-NumSubchannel***  Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only. |
| ***sl-PBPS-CPS-Config***  Indicates the allowed resource allocation schemes of full sensing only, partial sensing only, random resource selection only, or any combination(s), and the related configuration for power saving resource allocation schemes. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, it indicates the allowed resource allocation method configured per resource pool. This field is absent for *sl-TxPoolExceptional*. |
| ***sl-PreemptionEnable***  Indicates whether pre-emption is disabled or enabled in a resource pool. If 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. |
| ***sl-PriorityThreshold-UL-URLLC***  Indicates the threshold used to determine whether NR sidelink transmission is prioritized over uplink transmission of priority index 1 as specified in TS 38.213[13], clause 16.2.4.3, or whether PUCCH transmission carrying SL HARQ is prioritized over PUCCH transmission carrying UCI of priority index 1 if they overlap in time as specified in TS 38.213 [13], clause 9.2.5.0. |
| ***sl-PriorityThreshold***  Indicates the threshold used to determine whether NR sidelink transmission is prioritized over uplink transmission of priority index 0 as specified in TS 38.213[13], clause 16.2.4.3, or whether PUCCH transmission carrying SL HARQ is prioritized over PUCCH transmission carrying UCI of priority index 0 if they overlap in time as specified in TS 38.213 [13], clause 9.2.5.0. |
| ***sl-RB-Number***  Indicates the number of PRBs in the corresponding resource pool, which consists of contiguous PRBs only. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, it indicates the number of PRBs in the corresponding SL PRS dedicated resource pool, which consists of contiguous PRBs only. The remaining RB cannot be used (See TS 38.214[19], clause 8). |
| ***sl-StartRB-Subchannel***  Indicates the lowest RB index of the subchannel with the lowest index in the resource pool with respect to the lowest RB index of a SL BWP. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, it indicates the lowest RB index of the SL PRS dedicated resource pool with respect to the lowest RB index of a SL BWP. |
| ***sl-SubchannelSize***  Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB. |
| ***sl-SyncAllowed***  Indicates the allowed synchronization reference(s) which is (are) allowed to use the configured resource pool. |
| ***sl-SyncConfigIndex***  Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry *SL-SyncConfigList* of in *SIB12* for NR sidelink communication. |
| ***sl-TDD-Configuration***  Indicates the TDD configuration associated with the reception pool of the cell indicated by *sl-SyncConfigIndex*. |
| ***sl-ThreshS-RSSI-CBR***  Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the CBR measurement. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to (-112 + n\*2) dBm, and so on. |
| ***sl-TimeResource***  Indicates the bitmap of the resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, it indicates the bitmap of the SL PRS dedicated resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle. |
| ***sl-TimeWindowSizeCBR***  Indicates the time window size for CBR measurement. |
| ***sl-TimeWindowSizeCR***  Indicates the time window size for CR evaluation. |
| ***sl-TxPercentageList***  Indicates the portion of candidate single-slot PSSCH resources over the total resources. Value p20 corresponds to 20%, and so on. |
| ***sl-X-Overhead***  Accounts for overhead from CSI-RS, PT-RS. If the field is absent, the UE applies value *n0* (see TS 38.214 [19], clause 5.1.3.2). |

| ***SL-SyncAllowed* field descriptions** |
| --- |
| ***gnbEnb-Sync***  If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to eNB or gNB (i.e., synchronized to a reference UE which is directly synchronized to eNB or gNB). |
| ***gnss-Sync***  If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to GNSS (i.e., synchronized to a reference UE which is directly synchronized to GNSS). |
| ***ue-Sync***  If configured, the (pre-) configured resources can be used if the UE is synchronized to a reference UE which is not synchronized to eNB, gNB and GNSS directly or indirectly. |

| ***SL-PSCCH-Config* field descriptions** |
| --- |
| ***sl-FreqResourcePSCCH***  Indicates the number of PRBs for PSCCH in a resource pool where it is not greater than the number PRBs of the subchannel. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, this field indicates the number of PRBs for PSCCH in a dedicated SL PRS resource pool. |
| ***sl-DMRS-ScrambleID***  Indicates the initialization value for PSCCH DMRS scrambling. |
| ***sl-NumReservedBits***  Indicates the number of reserved bits in first stage SCI. |
| ***sl-TimeResourcePSCCH***  Indicates the number of symbols of PSCCH in a resource pool. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, this field indicates the number of symbols for PSCCH in a dedicated SL PRS resource pool. |

| ***SL-PSSCH-Config* field descriptions** |
| --- |
| ***sl-BetaOffsets2ndSCI***  Indicates candidates of beta-offset values to determine the number of coded modulation symbols for second stage SCI. The value indicates the index of Table 9.3-2 of TS 38.213 [13]. |
| ***sl-PSSCH-DMRS-TimePatternList***  Indicates the set of PSSCH DMRS time domain patterns in terms of PSSCH DMRS symbols in a slot that can be used in the resource pool. |
| ***sl-Scaling***  Indicates a scaling factor to limit the number of resource elements assigned to the second stage SCI on PSSCH. Value *f0p5* corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on. |

| ***SL-PSFCH-Config* field descriptions** |
| --- |
| ***sl-MinTimeGapPSFCH***  The minimum time gap between PSFCH and the associated PSSCH in the unit of slots. |
| ***sl-NumMuxCS-Pair***  Indicates the number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB. |
| ***sl-PSFCH-CandidateResourceType***  Indicates the number of PSFCH resources available for multiplexing HARQ-ACK information in a PSFCH transmission (see TS 38.213 [13], clause 16.3). |
| ***sl-PSFCH-HopID***  Scrambling ID for sequence hopping of the PSFCH used in the resource pool. |
| ***sl-PSFCH-Period***  Indicates the period of PSFCH resource in the unit of slots within this resource pool. If set to *sl0*, no resource for PSFCH, and HARQ feedback for all transmissions in the resource pool is disabled. |
| ***sl-PSFCH-RB-Set***  Indicates the set of PRBs that are actually used for PSFCH transmission and reception. The leftmost bit of the bitmap refers to the lowest RB index in the resource pool, and so on. Value 0 in the bitmap indicates that the corresponding PRB is not used for PSFCH transmission and reception while value 1 indicates that the corresponding PRB is used for PSFCH transmission and reception (see TS 38.213 [13]). |

| ***SL-PTRS-Config* field descriptions** |
| --- |
| ***sl-PTRS-FreqDensity***  Presence and frequency density of SL PT-RS as a function of scheduled BW. If the field is not configured, the UE uses K\_PT-RS = 2 |
| ***sl-PTRS-TimeDensity***  Presence and time density of SL PT-RS as a function of MCS. If the field is not configured, the UE uses L\_PT-RS = 1 |
| ***sl-PTRS-RE-Offset***  Indicates the subcarrier offset for SL PT-RS . If the field is not configured, the UE applies the value *offset00* (see TS 38.211 [16], clause 8.4.1.2.2). |

| ***SL-UE-SelectedConfigRP* field descriptions** |
| --- |
| ***sl-CBR-PriorityTxConfigList***  Indicates the mapping between PSSCH transmission parameter (such as MCS, PRB number, retransmission number, CR limit) sets by using the indexes of the configurations in *sl-CBR-PSSCH-TxConfigList*, CBR ranges by using the indexes to the entry of the CBR range configurations in *sl-CBR-RangeConfigList*, and priority ranges. It also indicates the default PSSCH transmission parameters to be used when CBR measurement results are not available, and MCS range for the MCS tables used in the resource pool. The field *sl-CBR-PriorityTxConfigList-v1650* is present only when *sl-CBR-PriorityTxConfigList-r16* is configured. |
| ***sl-MaxNumPerReserve***  Indicates the maximum number of reserved PSCCH/PSSCH resources that can be indicated by an SCI. |
| ***sl-MultiReserveResource***  Indicates if it is allowed to reserve a sidelink resource for an initial transmission of a TB by an SCI associated with a different TB, based on sensing and resource selection procedure. |
| ***sl-ResourceReservePeriodList***  Set of possible resource reservation period allowed in the resource pool in the unit of ms. Up to 16 values can be configured per resource pool. The value *ms0* is always configured. If this field is configured for a resource pool included in SL-BWP-PRSPoolConfig or SL-BWP-PRSPoolConfigCommon, it indicates the set of possible resource reservation period in the unit of ms allowed in the resource pool. Up to 16 values can be configured per resource pool. |
| ***sl-RS-ForSensing***  Indicates whether DMRS of PSCCH or PSSCH is used for L1 RSRP measurement in the sensing operation. |
| ***sl-SensingWindow***  Parameter that indicates the start of the sensing window. |
| ***sl-SelectionWindowList***  Parameter that determines the end of the selection window in the resource selection for a TB with respect to priority indicated in SCI. 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. |
| ***sl-Thres-RSRP-List***  Indicates a list of 64 thresholds, and the threshold should be selected based on the priority in the decoded SCI and the priority in the SCI to be transmitted. A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH/PSCCH RSRP in the associated data resource is above a threshold. |

| ***SL-PowerControl* field descriptions** |
| --- |
| ***sl-MaxTransPower***  Indicates the maximum value of the UE's sidelink transmission power on this resource pool when the sidelink transmission is performed only on this resource pool. The unit is dBm. If the sidelink transmission is PSFCH, and multiple resource pools are used, the maximum transmission power for PSFCH is configured as sum of fields *sl-maxTransPower* over multiple resource pools, as specified in TS 38.101-1 [15]. |
| ***sl-Alpha-PSSCH-PSCCH***  Indicates alpha value for sidelink pathloss based power control for PSCCH/PSSCH when *sl-P0-PSSCH-PSCCH* is configured. When the field is absent the UE applies the value 1. |
| ***sl-P0-PSSCH-PSCCH***  Indicates P0 value for sidelink pathloss based power control for PSCCH/PSSCH. If not configured, sidelink pathloss based power control is disabled for PSCCH/PSSCH. When *sl-P0-PSSCH-PSCCH-r17* is configured, the UE ignores *sl-P0-PSSCH-PSCCH-r16*. |
| ***dl-Alpha-PSSCH-PSCCH***  Indicates alpha value for downlink pathloss based power control for PSCCH/PSSCH when *dl-P0-PSSCH-PSCCH* is configured. When the field is absent the UE applies the value 1. |
| ***dl-P0-PSSCH-PSCCH***  Indicates P0 value for downlink pathloss based power control for PSCCH/PSSCH. If not configured, downlink pathloss based power control is disabled for PSCCH/PSSCH. When *dl-P0-PSSCH-PSCCH-r17* is configured, the UE ignores *dl-P0-PSSCH-PSCCH-r16*.  A Remote UE which is out of coverage, considers downlink pathloss based power control is disabled for PSCCH/PSSCH when *dl-P0-PSSCH-PSCCH* is configured. |
| ***dl-Alpha-PSFCH***  Indicates alpha value for downlink pathloss based power control for PSFCH when *dl-P0-PSFCH* is configured. When the field is absent the UE applies the value 1. For resource pools configured with PSFCH resources overlapping in time, this field is either not configured in any of the resource pools or configured with the same value for all the resource pools. |
| ***dl-P0-PSFCH***  Indicates P0 value for downlink pathloss based power control for PSFCH. If not configured, downlink pathloss based power control is disabled for PSFCH. When *dl-P0-PSFCH-r17* is configured, the UE ignores *dl-P0-PSFCH-r16.* For resource pools configured with PSFCH resources overlapping in time, this field is either not configured in any of the resource pools or configured with the same value for all the resource pools.  A Remote UE which is out of coverage, considers downlink pathloss based power control is disabled for PSFCH when *dl-P0-PSFCH* is configured. |

| ***SL-MinMaxMCS-Config* field descriptions** |
| --- |
| ***sl-MaxMCS-PSSCH***  Indicates the maximum MCS value when using the associated MCS table. If no MCS is configured, UE autonomously selects MCS from the full range of values. |
| ***sl-MinMCS-PSSCH***  Indicates the minimum MCS value when using the associated MCS table. If no MCS is configured, UE autonomously selects MCS from the full range of values. |

End of change

# Annex: SLPP TP

Start of Change

6.2 SLPP messages

6.2.1 General message structure

*– SLPP-PDU-Definitions*

This ASN.1 segment is the start of the SLPP PDU definitions.

-- ASN1START

-- TAG-SLPP-PDU-DEFINITIONS-START

SLPP-PDU-Definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

CommonIEsRequestCapabilities,

CommonIEsProvideCapabilities,

CommonIEsRequestAssistanceData,

CommonIEsProvideAssistanceData,

CommonIEsRequestLocationInformation,

CommonIEsProvideLocationInformation

FROM

SLPP-PDU-Common-Contents

Method-SL-AoA-RequestCapabilities,

Method-SL-AoA-ProvideCapabilities,

Method-SL-AoA-RequestAssistanceData,

Method-SL-AoA-ProvideAssistanceData,

Method-SL-AoA-RequestLocationInformation,

Method-SL-AoA-ProvideLocationInformation

FROM

SLPP-PDU-Method-SL-AoA-Contents

Method-SL-RSTD-RequestCapabilities,

Method-SL-RSTD-ProvideCapabilities,

Method-SL-RSTD-RequestAssistanceData,

Method-SL-RSTD-ProvideAssistanceData,

Method-SL-RSTD-RequestLocationInformation,

Method-SL-RSTD-ProvideLocationInformation

FROM

SLPP-PDU-Method-SL-RSTD-Contents

Method-SL-RTOA-RequestCapabilities,

Method-SL-RTOA-ProvideCapabilities,

Method-SL-RTOA-RequestAssistanceData,

Method-SL-RTOA-ProvideAssistanceData,

Method-SL-RTOA-RequestLocationInformation,

Method-SL-RTOA-ProvideLocationInformation

FROM

SLPP-PDU-Method-SL-RTOA-Contents;

Method-SL-RTT-RequestCapabilities,

Method-SL-RTT-ProvideCapabilities,

Method-SL-RTT-RequestAssistanceData,

Method-SL-RTT-ProvideAssistanceData,

Method-SL-RTT-RequestLocationInformation,

Method-SL-RTT-ProvideLocationInformation

FROM

SLPP-PDU-Method-SL-RTT-Contents;

-- TAG-SLPP-PDU-DEFINITIONS-STOP

-- ASN1STOP

NOTE: An implementation needs to include only the supported "Method" PDUs. Not supported methods do not need to be included, and therefore, do not contribute to the protocol size. For example, if "Method-A" is not supported by an implementation, the *SLPP-PDU-Method-A-Contents* PDU does not need to be included in the protocol.

/\*\*Skip unrelated parts\*\*/

6.2.2 Message definitions

/\*\*Skip unrelated parts\*\*/

– *RequestLocationInformation*

-- ASN1START

-- TAG-REQUESTLOCATIONINFORMATION-START

RequestLocationInformation ::= SEQUENCE {

criticalExtensions CHOICE {

c1 CHOICE {

requestLocationInformation RequestLocationInformation-IEs,

spare3 NULL, spare2 NULL, spare1 NULL

},

criticalExtensionsFuture SEQUENCE {}

}

}

RequestLocationInformation-IEs ::= SEQUENCE {

commonIEsRequestLocationInformation OCTET STRING OPTIONAL, -- Containing CommonIEsRequestLocationInformation

method-SL-AoA-RequestLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-AoA-RequestLocationInformation

method-SL-RSTD-RequestLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-RSTD-RequestLocationInformation

method-SL-RTOA-RequestLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-RTOA-RequestLocationInformation

method-SL-RTT-RequestLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-RTT-RequestLocationInformation

nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-REQUESTLOCATIONINFORMATION-STOP

-- ASN1STOP

– *ProvideLocationInformation*

-- ASN1START

-- TAG-PROVIDELOCATIONINFORMATION-START

ProvideLocationInformation ::= SEQUENCE {

criticalExtensions CHOICE {

c1 CHOICE {

provideLocationInformation ProvideLocationInformation-IEs,

spare3 NULL, spare2 NULL, spare1 NULL

},

criticalExtensionsFuture SEQUENCE {}

}

}

ProvideLocationInformation-IEs ::= SEQUENCE {

commonIEsProvideLocationInformation OCTET STRING OPTIONAL, -- Containing CommonIEsProvideLocationInformation

method-SL-AoA-ProvideLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-AoA-ProvideLocationInformation

method-SL-RSTD-ProvideLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-RSTD-ProvideLocationInformation

method-SL-RTOA-ProvideLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-RTOA-ProvideLocationInformation

method-SL-RTT-ProvideLocationInformation OCTET STRING OPTIONAL, -- Containing Method-SL-RTT-ProvideLocationInformation

nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-PROVIDELOCATIONINFORMATION-STOP

-- ASN1STOP

/\*\*Skip unrelated parts\*\*/

Editor's note Fields used in multiple places will be defined in the section of 6.3 SLPP information elements.

6.5 SLPP PDU Common Contents

/\*\*Skip unrelated parts\*\*/

*– CommonIEsRequestLocationInformation*

The *CommonIEsRequestLocationInformation* carries common IEs for a Request Location Information SLPP message Type.

-- ASN1START

-- TAG-COMMONIESREQUESTLOCATIONINFORMATION-START

CommonIEsRequestLocationInformation ::= SEQUENCE {

locationInformationType LocationInformationType,

triggeredReporting TriggeredReportingCriteria OPTIONAL,

periodicalReporting PeriodicalReportingCriteria OPTIONAL,

additionalInformation AdditionalInformation OPTIONAL,

qos QoS OPTIONAL,

environment Environment OPTIONAL,

...

}

LocationInformationType ::= ENUMERATED {

locationEstimateRequired,

locationMeasurementsRequired,

locationEstimatePreferred,

locationMeasurementsPreferred,

...

}

PeriodicalReportingCriteria ::= SEQUENCE {

reportingAmount ENUMERATED { ra1, ra2, ra4, ra8, ra16, ra32, ra64, ra-Infinity },

reportingInterval ENUMERATED { noPeriodicalReporting, ri0-25, ri0-5, ri1, ri2, ri4, ri8, ri16, ri32, ri64}

}

TriggeredReportingCriteria ::= SEQUENCE {

reportingDuration ReportingDuration,

...

}

ReportingDuration ::= INTEGER (0..255)

AdditionalInformation ::= ENUMERATED {

onlyReturnInformationRequested,

mayReturnAdditionalInformation,

...

}

QoS ::= SEQUENCE {

horizontalAccuracy HorizontalAccuracy OPTIONAL,

verticalCoordinateRequest BOOLEAN,

verticalAccuracy VerticalAccuracy OPTIONAL,

responseTime ResponseTime OPTIONAL,

velocityRequest BOOLEAN,

...

}

HorizontalAccuracy ::= SEQUENCE {

Accuracy INTEGER(0..127),

Confidence INTEGER(0..100),

...

}

VerticalAccuracy ::= SEQUENCE {

Accuracy INTEGER(0..255),

Confidence INTEGER(0..100),

...

}

HorizontalAccuracyExt-r15 ::= SEQUENCE {

accuracyExt-r15 INTEGER(0..255),

confidence-r15 INTEGER(0..100),

...

}

ResponseTime ::= SEQUENCE {

Time INTEGER (1..128),

...

}

Environment ::= ENUMERATED {

badArea,

notBadArea,

mixedArea,

...

}

}

-- TAG-COMMONIESREQUESTLOCATIONINFORMATION-STOP

-- ASN1STOP

Editor's note FFS on other parameters.

*– CommonIEsProvideLocationInformation*

The *CommonIEsProvideLocationInformation* carries common IEs for a Provide Location Information SLPP message Type.

-- ASN1START

-- TAG-COMMONIESPROVIDELOCATIONINFORMATION-START

CommonIEsProvideLocationInformation ::= SEQUENCE {

locationEstimate LocationCoordinates OPTIONAL, -- [locationTargetUe-sl-pos](Up to RAN2)

velocityEstimate Velocity OPTIONAL,

locationError LocationError OPTIONAL,

...

}

LocationCoordinates ::= CHOICE {

ellipsoidPoint Ellipsoid-Point,

ellipsoidPointWithUncertaintyCircle Ellipsoid-PointWithUncertaintyCircle,

ellipsoidPointWithUncertaintyEllipse EllipsoidPointWithUncertaintyEllipse,

polygon Polygon,

ellipsoidPointWithAltitude EllipsoidPointWithAltitude,

ellipsoidPointWithAltitudeAndUncertaintyEllipsoid EllipsoidPointWithAltitudeAndUncertaintyEllipsoid,

ellipsoidArc EllipsoidArc,

...

}

Velocity ::= CHOICE {

horizontalVelocity HorizontalVelocity,

horizontalWithVerticalVelocity HorizontalWithVerticalVelocity,

horizontalVelocityWithUncertainty HorizontalVelocityWithUncertainty,

horizontalWithVerticalVelocityAndUncertainty HorizontalWithVerticalVelocityAndUncertainty,

...

}

LocationError ::= SEQUENCE {

Locationfailurecause LocationFailureCause,

...

}

LocationFailureCause ::= ENUMERATED {

undefined,

requestedMethodNotSupported,

positionMethodFailure,

periodicLocationMeasurementsNotAvailable,

...

}

Ellipsoid-Point ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607) -- 24 bit field

}

Ellipsoid-PointWithUncertaintyCircle ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607), -- 24 bit field

uncertainty INTEGER (0..127)

}

EllipsoidPointWithUncertaintyEllipse ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607), -- 24 bit field

uncertaintySemiMajor INTEGER (0..127),

uncertaintySemiMinor INTEGER (0..127),

orientationMajorAxis INTEGER (0..179),

confidence INTEGER (0..100)

}

EllipsoidPointWithAltitude ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607), -- 24 bit field

altitudeDirection ENUMERATED {height, depth},

altitude INTEGER (0..32767) -- 15 bit field

}

EllipsoidPointWithAltitudeAndUncertaintyEllipsoid ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607), -- 24 bit field

altitudeDirection ENUMERATED {height, depth},

altitude INTEGER (0..32767), -- 15 bit field

uncertaintySemiMajor INTEGER (0..127),

uncertaintySemiMinor INTEGER (0..127),

orientationMajorAxis INTEGER (0..179),

uncertaintyAltitude INTEGER (0..127),

confidence INTEGER (0..100)

}

EllipsoidArc ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607), -- 24 bit field

innerRadius INTEGER (0..65535), -- 16 bit field,

uncertaintyRadius INTEGER (0..127),

offsetAngle INTEGER (0..179),

includedAngle INTEGER (0..179),

confidence INTEGER (0..100)

}

HorizontalVelocity ::= SEQUENCE {

Bearing INTEGER(0..359),

horizontalSpeed INTEGER(0..2047)

}

HorizontalWithVerticalVelocity ::= SEQUENCE {

Bearing INTEGER(0..359),

horizontalSpeed INTEGER(0..2047),

verticalDirection ENUMERATED{upward, downward},

verticalSpeed INTEGER(0..255)

}

HorizontalVelocityWithUncertainty ::= SEQUENCE {

Bearing INTEGER(0..359),

horizontalSpeed INTEGER(0..2047),

uncertaintySpeed INTEGER(0..255)

}

HorizontalWithVerticalVelocityAndUncertainty ::= SEQUENCE {

Bearing INTEGER(0..359),

horizontalSpeed INTEGER(0..2047),

verticalDirection ENUMERATED{upward, downward},

verticalSpeed INTEGER(0..255),

horizontalUncertaintySpeed INTEGER(0..255),

verticalUncertaintySpeed INTEGER(0..255)

}

Polygon ::= SEQUENCE (SIZE (3..15)) OF PolygonPoints

PolygonPoints ::= SEQUENCE {

latitudeSign ENUMERATED {north, south},

degreesLatitude INTEGER (0..8388607), -- 23 bit field

degreesLongitude INTEGER (-8388608..8388607) -- 24 bit field

}}

-- TAG-COMMONIESPROVIDELOCATIONINFORMATION-STOP

-- ASN1STOP

*– End of SLPP-PDU-Common-Contents*

-- ASN1START

END

-- ASN1STOP

6.6 SLPP PDU Method-SL-AoA Contents

*– SLPP-PDU-Method-SL-AoA-Contents*

This ASN.1 segment is the start of the SLPP PDU Method SL-AoA Contents definitions.

-- ASN1START

-- TAG-SLPP-PDU-METHOD-SL-AOA-CONTENTS-START

SLPP-PDU-METHOD-SL-AoA-CONTENTS DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- TAG-SLPP-PDU-METHOD-SL-AOA-CONTENTS-STOP

-- ASN1STOP

/\*\*Skip unrelated parts\*\*/

*– Method-SL-AoA-ProvideAssistanceData*

-- ASN1START

-- TAG-METHOD-SL-AOA-PROVIDEASSISTANCEDATA-START

Method-SL-AoA-ProvideAssistanceData ::= SEQUENCE {

sl-PRS-AssistanceData SEQUENCE (SIZE (1..slMaxTxUEs)) OF SL-PRS-Config OPTIONAL,

...

}

SL-PRS-Config ::= SEQUENCE {

expectedSL-AzimuthAoA-AndUncertainty INTEGER(0..3599), -- expected-SL-AoA-and-Uncertainty

expectedSL-ZenithAoA-AndUncertainty INTEGER(0..1799) -- expected-SL-AoA-and-Uncertainty

}

slMaxTxUEs INTEGER ::= 256 -- Max Tx UEs per Rx UE, FFS on the value

-- TAG-METHOD-SL-AOA-PROVIDEASSISTANCEDATA-STOP

-- ASN1STOP

Editor's note FFS on other parameters.

/\*\*Skip unrelated parts\*\*/

*– Method-SL-AoA-RequestLocationInformation*

-- ASN1START

-- TAG-METHOD-SL-AoA-REQUESTLOCATIONINFORMATION-START

Method-SL-AoA-RequestLocationInformation ::= SEQUENCE {

}

-- TAG-METHOD-SL-AoA-REQUESTLOCATIONINFORMATION-STOP

-- ASN1STOP

*– Method-SL-AoA-ProvideLocationInformation*

-- ASN1START

-- TAG-METHOD-SL-AOA-PROVIDELOCATIONINFORMATION-START

Method-SL-AoA-ProvideLocationInformation ::= SEQUENCE {

sl-AoA-SignalMeasurementInformation SL-AoA-SignalMeasurementInformation OPTIONAL,

...

}

SL-AoA-SignalMeasurementInformation ::= SEQUENCE {

sl-AoA-MeasList SL-AoA-MeasList,

...

}

SL-AoA-MeasList::= SEQUENCE (SIZE(1..slMaxTxUEs)) OF SL-AoA-MeasElement

SL-AoA-MeasElement ::= SEQUENCE {

los-NLOS-Indicator LOS-NLOS-Indicator OPTIONAL, -- sl-losNlosIndicator

sl-AzimuthAoA-FirstPathResult INTEGER (TBD) OPTIONAL, -- sl-PRS-AoA

sl-AzimuthAoA-LCS-GCS-Translation LCS-GCS-Translation OPTIONAL, -- sl-LCS-to-GCS-translation

sl-ZenithAoA-FirstPathResult INTEGER (TBD) OPTIONAL, -- sl-PRS-AoA

sl-ZenithAoA-LCS-GCS-Translation LCS-GCS-Translation OPTIONAL, -- sl-LCS-to-GCS-translation

sl-POS-ARP-ID-Rx INTEGER (1..4) OPTIONAL, -- sl-pos-arpID-Rx

sl-AoA-AdditionalPathList SL-AoA-AdditionalPathList OPTIONAL,

sl-PRS-RSRP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRP

sl-PRS-FirstPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRPP

...

}

LOS-NLOS-Indicator ::= SEQUENCE {

Indicator CHOICE {

Soft INTEGER (0..10),

Hard BOOLEAN

},

...

}

SL-AoA-AdditionalPathList ::= SEQUENCE (SIZE(1..2)) OF SL-AoA-AdditionalPath

SL-AoA-AdditionalPath ::= SEQUENCE {

sl-AzimuthAoA-AdditionalPathResult INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-AoA

sl-AzimuthAoA-LCS-GCS-Translation LCS-GCS-Translation OPTIONAL, -- sl-LCS-to-GCS-translation

sl-ZenithAoA-AdditionalPathResult INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-AoA

sl-ZenithAoA-LCS-GCS-Translation LCS-GCS-Translation OPTIONAL, -- sl-LCS-to-GCS-translation

sl-PRS-AdditionalPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-RSRPP

...

}

LCS-GCS-Translation ::= SEQUENCE {

Alpha INTEGER (0..3599),

beta INTEGER (0..3599),

gamma INTEGER (0..3599),

...

}

slMaxTxUEs INTEGER ::= 256 -- Max Tx UEs per Rx UE, FFS on the value

-- TAG-METHOD-SL-AOA-PROVIDELOCATIONINFORMATION-STOP

-- ASN1STOP

6.7 SLPP PDU Method-SL-RSTD Contents

*– SLPP-PDU-Method-SL-RSTD-Contents*

This ASN.1 segment is the start of the SLPP PDU Method SL-RSTD Contents definitions.

-- ASN1START

-- TAG-SLPP-PDU-METHOD-SL-RSTD-CONTENTS-START

SLPP-PDU-METHOD-SL-RSTD-CONTENTS DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- TAG-SLPP-PDU-METHOD-SL-RSTD-CONTENTS-STOP

-- ASN1STOP

/\*\*Skip unrelated parts\*\*/

*– Method-SL-RSTD-ProvideLocationInformation*

-- ASN1START

-- TAG-METHOD-SL-RSTD-PROVIDELOCATIONINFORMATION-START

Method-SL-RSTD-ProvideLocationInformation ::= SEQUENCE {

sl-RSTD-SignalMeasurementInformation SL-RSTD-SignalMeasurementInformation OPTIONAL,

...

}

SL-RSTD-SignalMeasurementInformation ::= SEQUENCE {

sl-RSTD-MeasList SL-RSTD-MeasList,

...

}

SL-RSTD-MeasList::= SEQUENCE (SIZE(1..slMaxTxUEs)) OF SL-RSTD-MeasElement

SL-RSTD-MeasElement ::= SEQUENCE {

los-NLOS-Indicator LOS-NLOS-Indicator OPTIONAL, -- sl-losNlosIndicator

sl-RSTD-FirstPathResult INTEGER (TBD) OPTIONAL, -- sl-PRS-RSTD

sl-POS-ARP-ID-Rx INTEGER (1..4) OPTIONAL, -- sl-pos-arpID-Rx

sl-RSTD-AdditionalPathList SL-RSTD-AdditionalPathList OPTIONAL,

sl-PRS-RSRP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRP

sl-PRS-FirstPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRPP

...

}

LOS-NLOS-Indicator ::= SEQUENCE {

Indicator CHOICE {

Soft INTEGER (0..10),

Hard BOOLEAN

},

...

}

SL-RSTD-AdditionalPathList ::= SEQUENCE (SIZE(1..2)) OF SL-RSTD-AdditionalPath

SL-RSTD-AdditionalPath ::= SEQUENCE {

sl-RSTD-AdditionalPathResult INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-RSTD

sl-PRS-AdditionalPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-RSRPP

...

}

LCS-GCS-Translation ::= SEQUENCE {

Alpha INTEGER (0..3599),

beta INTEGER (0..3599),

gamma INTEGER (0..3599),

...

}

slMaxTxUEs INTEGER ::= 256 -- Max Tx UEs per Rx UE, FFS on the value

-- TAG-METHOD-SL-RSTD-PROVIDELOCATIONINFORMATION-STOP

-- ASN1STOP

6.8 SLPP PDU Method-SL-RTOA Contents

*– SLPP-PDU-Method-SL-RTOA-Contents*

This ASN.1 segment is the start of the SLPP PDU Method SL-RTOA Contents definitions.

-- ASN1START

-- TAG-SLPP-PDU-METHOD-SL-RTOA-CONTENTS-START

SLPP-PDU-METHOD-SL-RTOA-CONTENTS DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- TAG-SLPP-PDU-METHOD-SL-RTOA-CONTENTS-STOP

-- ASN1STOP

/\*\*Skip unrelated parts\*\*/

*– Method-SL-RTOA-ProvideLocationInformation*

-- ASN1START

-- TAG-METHOD-SL-RTOA-PROVIDELOCATIONINFORMATION-START

Method-SL-RTOA-ProvideLocationInformation ::= SEQUENCE {

sl-RTOA-SignalMeasurementInformation SL-RTOA-SignalMeasurementInformation OPTIONAL,

...

}

SL-RTOA-SignalMeasurementInformation ::= SEQUENCE {

sl-RTOA-MeasList SL-RTOA-MeasList,

...

}

SL-RTOA-MeasList::= SEQUENCE (SIZE(1..slMaxTxUEs)) OF SL-RTOA-MeasElement

SL-RTOA-MeasElement ::= SEQUENCE {

los-NLOS-Indicator LOS-NLOS-Indicator OPTIONAL, -- sl-losNlosIndicator

sl-RTOA-FirstPathResult INTEGER (TBD) OPTIONAL, -- sl-PRS-RTOA

sl-POS-ARP-ID-Rx INTEGER (1..4) OPTIONAL, -- sl-pos-arpID-Rx

sl-RTOA-AdditionalPathList SL-RTOA-AdditionalPathList OPTIONAL,

sl-PRS-RSRP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRP

sl-PRS-FirstPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRPP

...

}

LOS-NLOS-Indicator ::= SEQUENCE {

Indicator CHOICE {

Soft INTEGER (0..10),

Hard BOOLEAN

},

...

}

SL-RTOA-AdditionalPathList ::= SEQUENCE (SIZE(1..2)) OF SL-RTOA-AdditionalPath

SL-RTOA-AdditionalPath ::= SEQUENCE {

sl-RTOA-AdditionalPathResult INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-RTOA

sl-PRS-AdditionalPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-RSRPP

...

}

LCS-GCS-Translation ::= SEQUENCE {

Alpha INTEGER (0..3599),

beta INTEGER (0..3599),

gamma INTEGER (0..3599),

...

}

slMaxTxUEs INTEGER ::= 256 -- Max Tx UEs per Rx UE, FFS on the value

-- TAG-METHOD-SL-RTOA-PROVIDELOCATIONINFORMATION-STOP

-- ASN1STOP

/\*\*Skip unrelated parts\*\*/

6.9 SLPP PDU Method-SL-RTT Contents

*– SLPP-PDU-Method-SL-RTT-Contents*

This ASN.1 segment is the start of the SLPP PDU Method SL-RTT Contents definitions.

-- ASN1START

-- TAG-SLPP-PDU-METHOD-SL-RTT-CONTENTS-START

SLPP-PDU-METHOD-SL-RTT-CONTENTS DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- TAG-SLPP-PDU-METHOD-SL-RTT-CONTENTS-STOP

-- ASN1STOP

/\*\*Skip unrelated parts\*\*/

*– Method-SL-RTT-ProvideLocationInformation*

-- ASN1START

-- TAG-METHOD-SL-RTT-PROVIDELOCATIONINFORMATION-START

Method-SL-RTT-ProvideLocationInformation ::= SEQUENCE {

sl-RTT-SignalMeasurementInformation SL-RTT-SignalMeasurementInformation OPTIONAL,

...

}

SL-RTT-SignalMeasurementInformation ::= SEQUENCE {

sl-RTT-MeasList SL-RTT-MeasList,

...

}

SL-RTT-MeasList::= SEQUENCE (SIZE(1..slMaxTxUEs)) OF SL-RTT-MeasElement

SL-RTT-MeasElement ::= SEQUENCE {

los-NLOS-Indicator LOS-NLOS-Indicator OPTIONAL, -- sl-losNlosIndicator

sl-PRS-RxTxTimeDiffFirstPathResult INTEGER (TBD) OPTIONAL, -- sl-PRS-RxTxTimeDiff

sl-POS-ARP-ID-Rx INTEGER (1..4) OPTIONAL, -- sl-pos-arpID-Rx

sl-PRS-RxTxTimeDiffAdditionalPathList SL-PRS-RxTxTimeDiffAdditionalPathList OPTIONAL,

sl-PRS-RSRP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRP

sl-PRS-FirstPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- sl-PRS-RSRPP

...

}

LOS-NLOS-Indicator ::= SEQUENCE {

Indicator CHOICE {

Soft INTEGER (0..10),

Hard BOOLEAN

},

...

}

SL-RTOA-AdditionalPathList ::= SEQUENCE (SIZE(1..2)) OF SL-RTOA-AdditionalPath

SL-PRS-RxTxTimeDiffAdditionalPathList ::= SEQUENCE {

sl-PRS-RxTxTimeDiffAdditionalPathResult INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-Rx-Tx-TimeDiff

sl-PRS-AdditionalPathRSRPP-Result INTEGER (TBD) OPTIONAL, -- additionalPath-SL-PRS-RSRPP

...

}

LCS-GCS-Translation ::= SEQUENCE {

Alpha INTEGER (0..3599),

beta INTEGER (0..3599),

gamma INTEGER (0..3599),

...

}

slMaxTxUEs INTEGER ::= 256 -- Max Tx UEs per Rx UE, FFS on the value

-- TAG-METHOD-SL-RTT-PROVIDELOCATIONINFORMATION-STOP

-- ASN1STOP