**3GPP TSG-RAN WG2 Meeting #121bis-e Draft R2-2304296**

**e-Meeting, 17th April – 26th April 2023**

**Agenda item:** 7.2.1

**Source:** Intel Corporation

**Title:** [AT121bis-e][422][POS] SLPP specification baseline (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the report of following at meeting offline discussion:

* [AT121bis-e][422][POS] SLPP specification baseline (Intel)

Scope: Collect comments on R2-2302738 and R2-2302739 and attempt to converge to a baseline, taking into account also related contributions on SLPP structure.

Intended outcome: Report and endorseable skeleton

Deadline: Monday 2023-04-24 2359 UTC

# Contact Information

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| Huawei, HiSilicon | yinghaoguo@huawei.com |
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| Apple | ssirotkin@apple.com |
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# Discussion

### 3.1 TS Skeleton

As discussed in R2-2302738:

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| In summary, we captured following agreements in [8].  Regarding the structure of SLPP, e.g. general part, procedure part , Information Element Abstract Syntax Definition, the structure of LPP (TS 37.355) can be used as baseline for further discussion.  Regarding the ASN.1 part of SLPP, follow NR RRC approach, e.g.  Define ASN.1 elements for common UE capabilities in a dedicated section (i.e. “UE capability information elements”);  - Common section for constraints    **Proposal 1: Endorse the TS Skeleton in R2-230xxxx as baseline for further updates.** |

Rapporteur would like to check companies’ view .

**Question 1: Do companies agree to endorse the TS skeleton in R2-2302739.**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSilicon | Yes, but | OK to leave the FFS for segmentation. We need to know what will be the size of the SLPP message and then see whether segmentation is needed that the SLPP msg cannot be transmitted in one shot  [Rapp] Thanks, then I will remove the section for now.  Then, for the chapters on reliable transport. There are two cases   * On PC5, we have already agreed that it shall be transported in the user plane, while reliable transport is not needed for user plane transport * For UE-LMF signaling, we have not agreed on how this can be done since there are still 3 options on the table. If the SLPP is included in the a LPP container, SLPP reliable transport will not be needed either since LPP has this functionality.   [Rapp] Thanks, I see your point. Based on “LPP reliable transport functionality is not used in the user-plane solution.”c, transport section is not needed since we have agreed SLPP over userplane. Therefore I will remove the section for now. |
| Lenovo | Yes but | * Regarding the version numbering, don’t we start with v0.0.0?   [Rapp] I think v0.0.1 is ok, same as TS38.331, TS38.321, etc.   * On page 2 the year “2022” should be corrected to “2023”.   [Rapp] You are right. Will correct.   * In clause 6.3.3 all editor’s notes can be removed. Those notes can be introduced based on first input.   [Rapp] You are right. Will remove. |
| CATT | Yes but | In 37.355, information elements are defined per positioning method. However UE capability information elements are defined in clause 6.3.2 and Positioning Method information elements are defined in clause 6.3.3 in R2-2302739. RAN2 should discuss whether UE capability information elements are defined per positioning method or not. CATT prefers to define the UE capabilities per positioning method.  Just for clarification, we agree to endorse the TS Skeleton in R2-2302739 **as baseline for further updates.**  [Rapp] RAN2 already agreed “*Define ASN.1 elements for common UE capabilities in a dedicated section (i.e. “UE capability information elements”);* “  The intention of 6.3.2 is to reflect this RAN2 agreements.  FFS point is  FFS whether any positioning method specific capability IEs should be grouped by positioning method. |
| vivo | Yes, but | About the IE structure, RAN1 is discussing unified positioning request/report (NRPPa like structure) vs method specific request/report (LPP like structure). We think that so far the title of section 6.3.3 should be changed to “6.3.3 Positioning information elements” or “6.3.3 Positioning [Method] information elements”.  [Rapp] it is out of RAN1 scope. They should not discuss how to structure IE/message on behalf of RAN2. |
| Xiaomi |  | We may keep the reliable transport part FFS  [Rapp] we may add it back if it is really needed. We can leave it as FFS for now. As commented by Lenovo, FFS can be added together with other first input in the TS. |
| ZTE | Yes | Agree this as baseline. Further, the different cast type of SLPP message may be included in the section 5 for each procedure.  [Rapp] We can add it once RAN2 has concrete conclusion on groupcast/broadcast. |
| Nokia | Yes but | Reliable transport and cast type should be FFS  [Rapp] Yes, we can leave them as FFs. |
| Ericsson | Looks good |  |
| Qualcomm | O.K. for now | On section 4.3 (reliable transport), this may still be needed for SLPP, but FFS for now is fine. In response to some comments above:  SLPP is carried as payload over the V2X/ProSe layer using the PC5 user plane protocol layering. There are no transport mechanisms enabling duplicate detection, acknowledgement and retransmission, etc.. PC5-U is not a "user plane solution" like e.g., SUPL with TCP/IP over Uu, which includes a reliable transport mechanism. Since Sidelink may experience lost packets, reliable transport would benefit SLPP. |
| LG | O.K. for now | Same view with Qualcomm. SLPP reliable transport mechanism should be supported for unicast and groupcast. For example, if UE suddenly moves out of PC5 coverage, SLPP packet could be lost at the SLPP level, which could not be covered by AS transport layers (i.e. PDCP/RLC/MAC/PHY). And, SLPP error handling also could not cover all cases of packet loss.  We are OK FFS for now. RAN2 can further discuss especially for groupcast reliable mechanism. |
| Apple | V002 is OK | BTW, we can probably add the SLPP acronym already at this stage. |

**Summary:**

Based on companies ‘ inputs, Rapporteur has updated the TS skeleton in v0.0.2, and seems it is agreeable. In addition, additional FFS is identified on “the need of reliable transport;”

Rapporteur would suggest:

**Proposal 1: RAN2 endorses TS skeleton v 0.0.2 in R2-2304306, the revision of R2-2302739 as baseline for further discussion.**

### 3.2 Open issues for the TS38.355

### 3.2.1 Need code and delta signalling

R2-2302738 discussed the open issues “FFS on Need code (e.g. how to support no UL/DL)”:

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| To our understanding, the principle used for PC5 RRC is to follow legacy RRC, i.e. Need code is applied if the PC5 RRC message is defined as downlink in legacy RRC, e.g. Need code is applied for *RRCReconfigurationSidelink* message, but not applied for *RRCReconfigurationCompleteSidelink* message. We can follow the same principle for SLPP message, i.e. Need code is applied for the messages which are provided from anchor/server to a target UE.  **Proposal 2: Need code is applied for SLPP messages transmitted from the anchor/server node/UE.** |

Rapporteur would like to check companies’ view .

**Question 2: Do companies agree the proposal 2 in R2-2302738 , i.e.**

**Need code is applied for SLPP messages transmitted from the anchor/server node/UE.**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSilicon | Yes,but | The need code also needs to be considered in the scenario of UE-LMF singaling  [Rapp] I assume we do not need to mention it since LMF is also the location server? |
| Lenovo | No | Delta signaling and need codes should be applied specific to the SLPP message. In our contribution R2-2302885 we discussed the applicability of delta signaling for the candidate SLPP messages and concluded that until now delta signaling should be applied at least for the unicast transmission of the SLPP ProvideAssistanceData message. We see no value in applying delta signaling e.g. for the error and abort messages when they are sent from the anchor/server node/UE to the target UE.  [Rapp] I see your point. We may change it to “Need code is applied for SLPP messages transmitted from the anchor/server node/UE when delta signalling is applied” |
| Intel | Yes | Updated based on Lenovo’s comments  Need code is applied for SLPP messages transmitted from the anchor/server node/UE when delta signalling is applied |
| CATT | Yes, but | Agree with Lenovo to discuss delta signaling and need codes based on the specific SLPP message. At this stage, we can agree not to exclude delta signaling and need codes. |
| Vivo | Yes, but | We assume only the entity who is responsible for coordination of SL positioning will use the delta signaling. Thus anchor UE can be excluded.  Besides, we would further clarify the server node/UE as LMF/positioning server UE.  Therefore, we propose to make the following update:  Need code is applied for SLPP messages transmitted from the LMF/positioning server UE when delta signalling is applied |
| Xiaomi | No | Different from LPP where there is the concept of location server to control all the configurations, the configuration of SLPP may come from either target UE, anchor UE, server UE. For example, for ranging, both target UE and anchor UE would send SL PRS configuration to each other. So, both target UE and anchor UE should be able to support delta configuration. We did agree that server UE can performs assistant data distribution, but it doesn’t mean that it is server UE that always performs assistant data distribution. Besides, even it is the server UE to perform the assistant data distribution, it needs to receive the assistant data from either anchor or target UE, then delta configuration should also be applicable.  Please Note that for sidelink  [Rapp] Seems the issue is related to whether anchor/target UE can also configure SL PRS to the peer UE. Further discussion is needed. |
| ZTE | No but | Need code is applied in Uu in DL message, however SL does not have clear DL and UL, and need code application should be based on per IE, not per node. So agree with CATT.  Delta signaling is ToAddModList and ToReleaseList. It is independent from need code. We are not sure why need code can be applied only when delta signaling is applied?  [Rapp] The purpose of Need M/Need R is to indicate what UE should do if the field is absent. If we do not support delta signalling, that means network shall always provide full configuration to UE. Then if the field is absent, the UE shall treat it as not configured. That’s why need code is related to the support of delta signalling. |
| Nokia | Yes but | Agree with Lenovo / CATT |
| Ericsson | FFS for now |  |
| Qualcomm | Not Yet | Need codes may be applied to IEs where appropriate, and not per e.g., UE role etc., as also mentioned by others above. Once we have the IEs defined, we'll see where they make sense (i.e., based on functionality). |
| LG | No | We understand intention to introduce need code, but it is early to decide on which sidelink direction is applicable for need code. This issue can be open and continue discussion when signaling design on stage-3. |
| Apple | No | Prefer to keep it FFS for now and discuss in the context of the discussions for the respective messages. |

R2-2302885 discussed open issue FFS support of delta signalling for unicast transmission

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| **Proposal 1:** Delta signaling is applied for the unicast transmission of the SLPP ProvideAssistanceData message. |

**Question 3: Do companies agree the proposal 1 in R2-2302885 , i.e.**

**Delta signaling is applied for the unicast transmission of the SLPP ProvideAssistanceData message..**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSilicon |  | The general understanding from the last R2 meeting is that we should first identify the requirement for SLPP signaling, like are there cases where frequent reconfiguration is needed. If there is such case, we need to support delta signaling. |
| Lenovo | Yes (proponent) | We assumed that same as in LPP the unicast SLPP ProvideAssistanceData message may contain information which was not requested by the target entity and may be sent periodically upon request by the target device. Of course these assumptions need to be confirmed. |
| Intel | Yes | In principle, we see the benefit to support delta signalling for Unicast assistance data message. But we would be ok to postpone the discussion until the parameters details are clear. |
| CATT | Yes, but | Same comment as Q2. |
| Vivo | Yes |  |
| Xiaomi | Yes |  |
| ZTE | Not sure | We are not sure whether there is a need to introduce delta signaling in SLPP, since LPP does not have. Are we assuming the the signaling payload of SLPP AD is very large and reconfigure frequently? If not, we suggest to keep LPP way as baseline for now, and if usecase of necessary is detected, the delta signaling can be supported then |
| Nokia | Yes | Same view as Intel on studying the actual need/benefits of delta signalling after parameters and overall structure are known. |
| Ericsson | Not Sure | Same view as ZTE. |
| Qualcomm | Not yet | Delta signalling implies that there is some "memory" in the sending endpoint what has been sent previously to another endpoint. We are not sure if this is sensible for SLPP (even for unicast), in particular if there are no reliable transport mechanisms (i.e., a sending entity must be sure what the receiving entity has received and stored before). The Proposal/statement that "Delta signaling is applied" is too strong. We need to understand the scenario/use case first. |
| LG | Not yet | Agree with Qualcomm. We still could not see the significant benefit for delta signalling. We think most SLPP messages may not be frequently changed with small amount during the session operation, which is different situation to RRC. |
| Apple | Same as for Q1 | Should be FFS for now |

R2-2302885 also discussed open issue FFS support of delta signalling for groupcast/broadcast transmission

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| **Proposal 2:** Delta signaling may be applied for the groupcast transmission of the SLPP ProvideAssistanceData message when protection of groupcast transmission of SL positioning assistance data information can be ensured.  **Proposal 3:** No delta signaling is applied for the broadcast transmission of the SLPP ProvideAssistanceData message if supported. |

**Question 4: Do companies agree the proposal 2 in R2-2302885 , i.e.**

**Delta signaling may be applied for the groupcast transmission of the SLPP ProvideAssistanceData message when protection of groupcast transmission of SL positioning assistance data information can be ensured.**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSilicon |  | Similar to the unicast scenario, requirements need to be first clarified |
| Lenovo | Yes (proponent) | But we are ok to defer this proposal until decision on support of groupcast transmission has been made and scenarios/requirements for groupcast transmission become clearer. |
| Intel | Yes | In principle, we see the benefit to support delta signalling for groupcast assistance data message. But we would be ok to postpone the discussion until the parameters details are clear. |
| CATT | Not sure | For groupcast, group members may be changed during the SLPP procedure. If group member change is not allowed, delta signaling can be considered. Otherwise, delta signaling should not be used. |
| vivo | Not sure | Firstly, scenarios/requirements for groupcast transmission is not clear as mentioned by Lenovo. Secondly, agree with CATT that group member change is an issue, e.g., a new member is added after the initial configuration, but before the delta configuration. Thirdly, we are not sure whether groupcast can ensure that all the member can receive the message. If not, what is the UE’s action if the UE receives the delta, but not the initial configuration. Even the UE may be not able to distinguish initial configuration or delta configuration. |
| Xiaomi |  | We should wait until the functionality of groupcast is clear. |
| ZTE | No | No need to introduce delta signaling to groupcast and broadcast. Delta signaling is an optimization but it can not guarantee the complete reception. |
| Nokia | Yes but | Same view as above, we should study this only once all parameters and overall structure are known. |
| Ericsson |  | Same view as HW and ZTE |
| Qualcomm | Not yet. | Please see our comments to Question 3 above. |
| LG | Not yet. | See Q3 above. |
| Apple | Not yet |  |

**Question 5: Do companies agree the proposal 3 in R2-2302885 , i.e.**

**No delta signaling is applied for the broadcast transmission of the SLPP ProvideAssistanceData message if supported..**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSIlicon | Yes | There is no UE state in the configuration by broadcast and it is not possible to configure by delta signaling. This is the same as the current SIB and posSIB |
| Lenovo | Yes (proponent) | We can agree on it as working assumption since the final decision on support of broadcast transmission is subject to SA3. |
| Intel | Yes | Agree with Huawei and Lenovo |
| CATT | Yes | Agree with Huawei, for broadcast, which UE is receiving the assistance data is unknown by the transmitter. So the idea of exchange messages by delta signaling doesn’t work. |
| Vivo | Yes |  |
| Xiaomi | Yes |  |
| ZTE | Yes |  |
| Nokia | Yes | Agree with Huawei and Lenovo |
| Ericsson | Yes | Agree with Huawei and Lenovo |
| Qualcomm | Maybe | This seems sensible, if SLPP can select the cast-type. |
| LG | Yes | We think broadcast can be used in session-lee operation. Although cast type is theoretically independent from session-based/less operation, most feasible solution of session-less operation may use broadcast mode. In session-less, we are not sure delta controlling is possible. |
| Apple | Yes |  |

If proposal 1, 2 and 3 in R2-2302885 are agreeable, R2-2302885 also proposed to introduce full configuration as what we have in RRC.

**Question 6: Do companies agree the proposal 4 in R2-2302885 , i.e.**

**Consider full configuration signaling for the unicast/groupcast transmission of the SLPP ProvideAssistanceData message.**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSilicon | No, but | This seems to be somewhat related to delta signaling. If delta signaling is not needed, full configuration also seems less motivated  Also, need to clarify what will be the scenario full configuration will be needed, like for LTE/NR, there is case of inter-RAT handover and gNB with different capabilities. While are these scenario also applicable for SLPP??  [Lenovo] In our contribution R2-2302285 we addressed two examples for using full configuration:   * In case of unicast transmission of the SLPP ProvideAssistanceData message if the amount of delta is low. * In case of groupcast transmission of the SLPP ProvideAssistanceData message (if supported) whenever a new target entity joins a group of target entities. |
| Lenovo | Yes (proponent) | But we are ok to defer the decision on this proposal to a later stage when the scenarios/requirements for delta signaling/need codes for unicast/groupcast become clearer. |
| Intel | No | Agree with Huawei. The intention of “full config” bit is to support HO between gNBs in different release, and then the old gNB cannot understand what configuration has been configured by new version gNB. Therefore “full configuration” is to indicate all original configuration will be reconfigured. It is unrelated to whether delta is needed or not. If network does not want to use delta signalling, it can just provide all parameters.  We may come back to this later if any issue is identified. |
| CATT | Yes | Full configuration can be supported. |
| Vivo | No | Agree with Huawei and Intel. It needs to be justified, i.e., clarify the scenario full configuration is needed. |
| Xiaomi | No | Agree with Huawei and Intel. |
| ZTE |  | Ok to postpone the issue |
| Nokia | No | Agree with Huawei and Intel. |
| Ericsson | Prefer FFS for now |  |
| Qualcomm | Not Yet | Need to sort out the use case/scenario for delta signalling first. |
| LG | Not Yet | Same view with Qualcomm. Need to know use case/scenario for delta signalling first. |
| Apple | Not Yet | Should be FFS for now |

### 3.2.2 Import IEs from LPP

R2-2302738 also discussed whether import IE definition from LPP as

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| Similar to PC5 RRC, if some IE definitions from LPP can be reused for SLPP, we may simply import them from LPP specification, as  IMPORTS  Xxx  FROM LPP-PDU-Definitions;  **Proposal 3: We may import some IE definitions from LPP specification if needed.** |

R2-2302885 also discussed to import IE definition from LPP as

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| **Proposal 6:** Create SLPP ASN.1 as separate module and use IMPORT function for importing useful Ies, constants and LPP messages from the LPP module if deemed necessary. |

Rapporteur would like to check companies’ view .

**Question 7: Do companies agree that we may import some IE definitions and constants from LPP specification if needed.**

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| **Company** | **Yes/No** | **Remark** |
| Huawei, HiSilicon | Yes | We don’t need to duplicate Ies if they are already defined in the other 3GPP specs. |
| Lenovo | Yes (proponent) | The question is not complete. We suggest to import “constants“ from LPP specification as well if needed.  The key advantages of this two-module approach are:   1. It allows easy extraction of SLPP ASN.1 code via automated methods and future extension of the SLPP ASN.1. 2. Better maintenance of ASN.1, i.e., potential changes to SLPP ASN.1 will not impact LPP ASN.1. 3. There will be no impacts to positioning UEs which do not support SL positioning. |
| Intel | Yes | Added constants in the question. |
| CATT | Yes | It is unnecessary to define duplicated Ies. Import is legacy operation. |
| Vivo | Not sure | Within one spec, the “import” scheme between different modules is OK. But we are not sure whether the “import” scheme cross specs is feasible and beneficial. Moreover, the imported IE from LPP may cite some sub-Ies which are not directly imported by SLPP. It may be very difficult to get a whole and independent SLPP ASN.1 code since there may be multiple levels of nesting for imported Ies. Also, the “import” scheme increases the couple between SLPP and LPP. The modification of imported Ies in LPP specification will impact the SLPP specification. For some cases, we may need to consider the impact on SLPP when we would enhance the coupled Ies in LPP. |
| Xiaomi |  | We share same concern as vivo. If SLPP is defined in a different spec from LPP, the IMPORT function of ASN.1 may not work. |
| ZTE | Yes | It can be allowed, depend on the usecases in the further investigation |
| Nokia | No but | Similar view as vivo. Cross-module maintenance is more complex and prone to errors under evolving versions. Some fundamental (invariant) parameters could be reused though. |
| Ericsson | FFS for now | when SLPP would be carried as container via LPP; if possible, for that case good if we can reuse LPP module and thus without having to import? |
| Qualcomm | Not Yet | We need to see first which (and how many) IEs are really the same between LPP and SLPP.  In Qualcomm contribution R2-2303591, section 8 we provide some additional considerations for the ASN.1 design.  [Rapp] Thanks, will capture the proposals 28, 29.30 from R2-2303591 as open issues for further discussion. |
| LG | Not sure | Not sure there is exactly same message between LPP and SLPP. In addition, we wonder if it is possible to import between different ASN.1 formats i.e. if SLPP ASN.1 format is different to LPP. |
| Apple | Probably yes |  |

### 3.2.3 Too early to discuss

Following issues are valid, but Rapporteur think these issues should be discussed when the details are more clear, therefore no proposal on this.

Issue 1: Setup/release or release (R2-2302885 );

* Proposal 5: Discuss and agree on the basic release mechanisms to support for session-based SLPP.

Issue 2: Message mode indication (R2-2303591)

* Proposal 14: SLPP should indicate the transaction (communication) mode to be used for each SLPP message, i.e. whether broadcast mode, groupcast mode or unicast mode is to be used (e.g., in a common SLPP message header). At least the following common transaction modes shall be supported:
* • Unicast transaction
* • Group Transaction with Group Replies
* • Group Transaction with Unicast Replies
* • Broadcast Transaction.

**Summary:** Based on the discussion in section 3.2, companies are not ready to agree how to handle Need code, delta signalling, full configuration, import IE from LPP and would prefer to postpone the discussion until the parameter details are clear.

There is clear majority that delta signaling is not applied for the broadcast transmission of the SLPP ProvideAssistanceData message if supported. However as commented by Qualcomm, it is related to SLPP design. From Rapporteur perspective, it is related to whether we have separate message for broadcast, groupcast, unicast or not. Anyway need code will be there if these cast types share the common message structure, and if delta signalling is applied for unicast and/or groupcast. Therefore the discussion should also be postponed.

Rapporteur would suggest to capture follow FFS for further discussion:

**Proposal 2: RAN2 will discuss delta signalling, Need code, full configuration, import IE from LPP, setup/release when the parameters details are clear;**

**Proposal 3: RAN2 to further discuss following issues::**

* **FFS the need of reliable transport**
* **FFS SLPP message header, e.g. cast type, session ID, UE ID, transaction ID, etc. P14, P28 from R2-2303591**
* **FFS each message body IE is a SEQUENCE of individual IEs, applicable to all or individual positioning methods. P28 from R2-2303591**
* **FFS The SLPP ASN.1 design should allow for "selective ASN.1 compilation". The overall SLPP functionality is divided into "groups", where each group is defined as a separate ASN.1 module. A "group" may correspond to a positioning method, but other grouping may also be possible. An implementation needs to compile only the SLPP modules which contain a supported "group" (functionality, positioning method, etc.). P30 from R2-2303591**

# Summary

Based on the input from companies, we have the following proposals:

**Proposal 1: RAN2 endorses TS skeleton v 0.0.2 in R2-2304306, the revision of R2-2302739 as baseline for further discussion.**

**Proposal 2: RAN2 will discuss delta signalling, Need code, full configuration, import IE from LPP, setup/release when the parameters details are clear;**

**Proposal 3: RAN2 to further discuss following issues::**

* **FFS the need of reliable transport**
* **FFS SLPP message header, e.g. cast type, session ID, UE ID, transaction ID, etc. P14, P28 from R2-2303591**
* **FFS each message body IE is a SEQUENCE of individual IEs, applicable to all or individual positioning methods. P28 from R2-2303591**
* **FFS The SLPP ASN.1 design should allow for "selective ASN.1 compilation". The overall SLPP functionality is divided into "groups", where each group is defined as a separate ASN.1 module. A "group" may correspond to a positioning method, but other grouping may also be possible. An implementation needs to compile only the SLPP modules which contain a supported "group" (functionality, positioning method, etc.). P30 from R2-2303591**

# Reference

[1] R2-2302738 Further considerations on SLPP specification Intel Corporation

[2] R2-2302739 TS 38.355 skeleton Intel Corporation

[3] R2-2302885 Discussion on further SLPP aspects Lenovo discussion

[4] R2-2303591 Sidelink Positioning Protocol (SLPP) Signaling and Procedures Qualcomm Incorporated