**3GPP TSG-RAN WG1 Meeting #114 R1-23xxxxx**

**Toulouse, France, 21-25 August, 2023**

**Agenda Item: 9.17**

**Source: Moderator (Huawei)**

**Title: Summary of email discussion [Post114-38.212-NR\_pos\_enh2-Core]**

**Document for: Discussion and Decision**

# Introduction

This document summarizes the discussions on the 38.212 draft CR on NR positioning, and aims to stabilize the 38.212 draft CR.

[Post114-38.212-NR\_pos\_enh2-Core] Email discussion on Rel-18 draft CRs by September 7 – Editors

# First round discussions

This section summarize the first round email discussions on draft CR v00. Companies are encouraged to provide the first round views by 09/05 (Tuesday), 6:00am UTC, then we can update the draft CR accordingly for the next step discussions.

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| *Company* | *View* |
| Editor | The changes are marked with author “Yan Cheng\_post RAN1#114” on top of the version R1-2306321 endorsed in RAN1#113, which are to reflect the agreements from RAN1#114. |
| Intel | * **Comment#1**

Suggest to change the name of the field “First SL PRS indicator” to “First SL PRS resource indicator”, and “Resource ID indication” to “SL PRS resource assignment” to follow the naming for SL communication.

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| - First SL PRS indicator - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources in a dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*.- SCI format 1-B fields according to clause 8.3.1.2:- Time resource assignment- Resource ID indication |

[Chengyan]: In general, I prefer to avoid long field name in the DCI format in TS 38.212, which make it easier for other specs to cite the field. Following the above principle, to me “first SL PRS indicator” is fine, since we also have the detailed field description defined here, which can explicitly show what is exactly indicated by this field. Therefore, I prefer to keep it as it is, unless there is any problem identified. For “SL PRS resource assignment”, as shown in SCI format 1-B, resource ID is eventually derived from this field, which is different from SL communication. Therefore, I think ok to use resource ID indication here. * **Comment#2**

Suggest to remove the bit-field “Embedded SCI format payload” and associated description. A separate indication of the payload is not necessary. The payload size alignment is already captured in 214. Also, for Table 8.4.1.4-1, the last column titled “Embedded SCI format paylaod” should be removed.[Chengyan]: We cannot rely on 38.214 to determine the payload size and content of SCI format in TS 38.212, 38.212 itself should be self-contained. If we remove this field in TS 38.212, it will result in the misunderstanding that SCI format doesn’t contain the information for SCI format 2-A/2-B. * **Comment #3**

Suggest to update the following as dedicated and shared resource pool is now defined in Clause 8 in 214. [Chengyan]: I am fine to clarify this. It will be reflected in the next update.

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| SCI format 1-B is used for the scheduling of SL PRS for a dedicated resource pool.  |

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| SCI format 2-D is used for the decoding of PSSCH and the scheduling of SL PRS for a shared resource pool.  |

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| OPPO | 1． Propose to use , and this parameter should be total number of SL PRS resources in a slot.

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| - First SL PRS indicator - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources in a slot of dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*. |

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| - Resource ID indication – bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 2; otherwise x bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 3. The value is the total number of SL PRS resources in a slot of dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*. |

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| - SL PRS resource ID – bits, where the value is the total number of SL PRS resources in a slot of shared resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*. |

[Chengyan]: I think it is clear from all the description the notation here is for SL PRS. I am fine to update it though. Will reflect in the next update. 2. propose following changes to SCI 2-D.

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| - Embedded SCI format payload –size of SCI 2-B. This field is set to the associated payload of the embedded SCI format indicated by the ‘Embedded SCI format’ field as defined in Table 8.4.1.4-1.Table 8.4.1.4-1: Embedded SCI format and payload

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| Value of the Embedded SCI format field | Embedded SCI format | Embedded SCI format payload |
| 00 | SCI format 2-A with necessary padding | Set to all fields included in SCI format 2-A  |
| 01 | SCI format 2-B | Set to all fields included in SCI format 2-B |
| 10 | Reserved | Reserved |
| 11 | Reserved | Reserved |

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[Chengyan]: As explained in the editor’s note, the final size may not be the size of SCI 2-B. Once there is further agreement per the issues raised in the editor’s note, we can see whether/how to update accordingly. 3. is considered only in rate matching for SCI 2-D.

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| For SCI 2-D is the number of symbols for SL PRS if provided by the higher layer parameter *XYZ* , and = 0 otherwise. |

[Chengyan]: Thanks. I will update as below in the next update.  is the number of symbols for SL PRS provided by the higher layer parameter *XYZ* if the 2nd-stage SCI is SCI format 2-D, and = 0 otherwise. |
| vivo | Considering the AGC structure of dedicated RP is different with shared RP, the SL PRS for dedicated RP can not be mapped to DisTxPool. So, we prefer to remove the yellow part in section 7.3.1.4.3.

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| Resource pool index – bits, where *I* is the total number of resource pools for transmission configured by the higher layer parameter *sl-TxPoolScheduling*, if configured, ~~and~~ *~~sl-DiscTxPoolScheduling~~*~~, if configured.~~ |

[Chengyan]: Seems Nokia has different view here. However, since there is no explicit agreement and it may depend on the final RRC structure, let me remove for now, and once the formal RRC list is available we can add back or update if needed, as expressed in the editor’s note. In addition, we prefer align the name about ”SL PRS resource ID”, ie., change “Resource ID indication” in section 7.3.1.4.3 and 8.3.1.2 to “SL PRS resource ID indication”

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| 7.3.1.4.3 SL PRS resource ID - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources in a dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*.- SCI format 1-B fields according to clause 8.3.1.2:- Time resource assignment- SL PRS Resource ID indication[Chengyan]: I think section 7.3.1.4.3 and 8.3.1.2 are aligned. In addition, please check my reply to Intel above on the naming of the fields. 8.3.1.2 SCI format 1-B- SL PRS resource ID indication – bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 2; otherwise x bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 3. The value is the total number of SL PRS resources in a dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*.[Chengyan]: Please check my reply to Intel above. To avoid long name of the field, I think ok not to add “SL PRS” here, and it is very clear it is only for SL PRS.  |

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| ZTE | For SCI format 2-D, we think Embedded SCI format payload should be kept. Even though the payload alignment is already captured in 38.214, it is agreed that SCI 2-D should include either all the fields included in SCI format 2-A or all fields included in SCI format 2-B. Those fields (e.g., cast type, source ID and destination ID) should be indicated in SCI 2-D.

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

Also, we prefer to list all the fields more clearly in SCI format 2-D. In legacy DCI format 3-0, we also explicitly list filed “time resource assignment” and field “frequency resource assignment” of SCI 1-A. Similarly, when “embedded SCI format” is 00 or 01 for SCI format 2-D, detailed fields can be listed in Table 8.4.1.4-1, here is our suggested changes:[Chengyan]: As long as the spec is clear, it would be good to keep it concise. I think the current version is fine. Table 8.4.1.4-1: Embedded SCI format and payload

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| Value of the Embedded SCI format field | Embedded SCI format | Embedded SCI format payload |
| 00 | SCI format 2-A | HARQ process number – 4 bits.New data indicator – 1 bit.Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2.Source ID – 8 bits as defined in clause 8.1 of [6, TS 38.214].Destination ID – 16 bits as defined in clause 8.1 of [6, TS 38.214].HARQ feedback enabled/disabled indicator – 1 bit as defined in clause 16.3 of [5, TS 38.213].Cast type indicator – 2 bits as defined in Table 8.4.1.1-1 and in clause 8.1 of [6, TS 38.214].CSI request – 1 bit as defined in clause 8.2.1 of [6, TS 38.214] and in clause 8.1 of [6, TS 38.214]. |
| 01 | SCI format 2-B | HARQ process number – 4 bits.New data indicator – 1 bit.Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2.Source ID – 8 bits as defined in clause 8.1 of [6, TS 38.214].Destination ID – 16 bits as defined in clause 8.1 of [6, TS 38.214].HARQ feedback enabled/disabled indicator – 1 bit as defined in clause 16.3 of [5, TS 38.213].Zone ID – 12 bits as defined in clause 5.8.11 of [9, TS 38.331].Communication range requirement – 4 bits determined by higher layer parameter *sl-ZoneConfigMCR-Index*. |
| 10 | Reserved | Reserved |
| 11 | Reserved | Reserved |

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| Sharp | * **Comment #1, on 7.3.1.4.3:**

There has not been any RAN1 agreement on the actual DCI format(s) for scheduling of SL PRS, e.g. it is still not decided whether the fields here are for DCI format 3\_0, or a new DCI format 3\_2. Suggest to remove the subclause title “7.3.1.4.3 Format 3\_2”, and replace other occurrences of “3\_2” with a more general name e.g. “3\_X”.[Chengyan]: Looking at the agreements and the contents in DCI format 3\_0, I think it is clearer to set a new DCI format for it. Similar as other items, it is not necessary to have explicit agreement on whether to add new DCI format or update the legacy DCI format, the clear way can be chosen during the draft CR phase. * **Comment #2, on 7.3.1.4.3:**

The following sentence seems self-contradictory (the whole “configuration index” field is only of non-zero size for the case of SL-CS-RNTI being configured, how can it be “reserved” when the RNTI is SL-CS-RNTI?) Was the intention of the last “SL-CS-RNTI” actually “SL-RNTI” as in the legacy spec?

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| If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-CS-RNTI. |

[Chengyan]: There is a typo here actually, the RNTI you highlight in yellow should be SL-RNTI. The typo will be corrected in the next update. * **Comment #3, on 8.3.1.2:**

There is RAN1 agreement on the x below, although put around brackets. We see no reason not to capture it. It can be updated if the RAN1 agreement is updated.

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| - Resource ID indication – bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 2; otherwise x bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 3. The value is the total number of SL PRS resources in a dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*. |

[Chengyan]: Brackets already means that it is not decided yet, thus equal to no agreement. By the way, for CR submitted to RAN, we cannot keep bracket, thus can only put x here. * **Comment #4, on 8.3.1.2:**

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| - Reserved - bits as configured by higher layer parameter *XYZ*, with value set to zero. |

[Chengyan]: I don’t see any difference on the original one and what you proposed. * **Comment #5:**

Agree with OPPO that in a few places of the draft CR, should be the total number of SL PRS resources in a slot of a resource pool.[Chengyan]: Please check my reply to OPPO.  |
| xiaomi | **Comment 1 (for DCI format 3\_2)**SL PRS resource ID is defined in a slot, so the spec should reflect this. And we propose use unified terminology in all the fields of DCI format 3\_2.

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| - Resource pool index – bits, where *I* is the total number of resource pools for transmission configured by the higher layer parameter *sl-TxPoolScheduling*, if configured, and *sl-DiscTxPoolScheduling*, if configured.- Time gap – 3 bits determined by higher layer parameter *sl-DCI-ToSL-Trans,* as defined in [6, TS 38.214]- SL PRS resource ID within the first scheduling SL slot - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources within a slot in a dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*.- SCI format 1-B fields according to clause 8.3.1.2:- Time resource assignment- SL PRS Resource ID within the further scheduling 1 or 2 SL slots - Configuration index – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled by SL-CS-RNTI; otherwise 3 bitsas defined in clause *XYZ* of [6, TS 38.214]. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-CS-RNTI. - Padding bits, if required |

[Chengyan]: Yes, “within a slot” will be reflected in next update. In addition, regarding the naming of the fields, please check my replies to Intel above. **Comment 2 (for SCI format 1-B)**In legacy SL communication, *sl-MultiReserveResource* is used to indicate if it is allowed to reserve a sidelink resource for an initial transmission of a TB by an SCI associated with a different TB, the description is shown in below:

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| 1. 8.3.1.1 SCI format 1-A

- Resource reservation period – bits as defined in clause 16.4 of [5, TS 38.213], where is the number of entries in the higher layer parameter *sl-ResourceReservePeriodList*, if higher layer parameter *sl-MultiReserveResource* is configured; 0 bit otherwise. |

So we propose to reuse a similar parameter for the reservation periodicity indication for SCI forma 1-B.

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| Priority – 3 bits as specified in clause x.x of [12, TS 23.586] and clause x.x of [8, TS 38.321]. Value '000' of Priority field corresponds to priority value '1', value '001' of Priority field corresponds to priority value '2', and so on. - Source ID – 12 or 24 bits determined by higher layer parameter *XYZ*, as defined in clause x.x of [6, TS 38.214].- Destination ID – 24 bits as defined in clause x.x of [6, TS 38.214]. - Cast type indicator – 2 bits as defined in Table 8.3.1.2-1 and in clause x.x of [6, TS 38.214].- Resource reservation period – bits as defined in clause xx of [5, TS 38.213], where is the number of entries in the higher layer parameter *reservationPeriodAllowed-Dedicated-SL-PRS-RP*, if higher layer parameter *MultiReserveResource -Dedicated-SL-PRS-RP* is configured; 0 bit otherwise.- Time resource assignment – 5 bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 2; otherwise 9 bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 3, as defined in clause x.x.x of [6, TS 38.214].- Resource ID indication – bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 2; otherwise x bits when the value of the higher layer parameter *sl-MaxNumPerReserveSL-PRS* is configured to 3. The value is the total number of SL PRS resources within a slot in a dedicated resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*.- SL PRS request – 1 bit as defined in clause x.x of [TS 38.214] when the higher layer parameter *XYZ* is provided; 0 bit otherwise.- Reserved - bits as configured by higher layer parameter *XYZ*, with value set to zero. |

[Chengyan]: The parameter you proposed is not included in the latest RRC list for positioning. Let’s keep it as it is for now, once there is formal RRC parameter available, we can update accordingly. I will add an editor’s note to clarify this.**Comment 3 (for SCI format 2-D)**According to the following agreements, a SL PRS resource is identified by a combination of SL PRS resource ID and a SL PRS frequency domain allocation, so should be equal to the SL PRS resource ID number, not resource number.

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| **Agreement**For a shared resource pool* A SL PRS resource refers to a time-frequency resource within a slot that is used for SL PRS transmission.
* Characteristics associated with a SL PRS resource in a slot of a shared resource pool include at least:
	+ SL PRS resource ID,
	+ SL PRS comb offset and associated SL PRS comb size (N),
	+ SL PRS starting symbol and number of SL PRS symbols (M),
	+ SL PRS frequency domain allocation
		- SL PRS freq domain allocation is not used to identify a unique SL PRS resource ID
* A SL PRS resource is identified by a combination of SL PRS resource ID and a SL PRS frequency domain allocation. This combination is unique within a slot of a shared resource pool.

NOTE 1: The above does not imply need for signalling/(pre-)configuration of all these parameters |

So we propose to do the following modification for SCI forma 2-D.

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| - SL PRS resource ID – bits, where the value  is the total number of SL PRS resources ID within a slot in a shared resource pool for SL PRS transmission and provided by the higher layer parameter *XYZ*.- SL PRS request – 1 bit as defined in clause x.x of [6, TS 38.214] when the higher layer parameter *XYZ* is provided; 0 bit otherwise.- Embedded SCI format – 2 bits. This field indicates the embedded SCI format as defined in Table 8.4.1.4-1.- Embedded SCI format payload – number of bits determined according to Table 8.4.1.4-1. This field is set to the associated payload of the embedded SCI format indicated by the ‘Embedded SCI format’ field as defined in Table 8.4.1.4-1. |
| [Chengyan]: Thanks. Will reflect in the next update as “the total number of SL PRS resource IDs”.  |

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| LGE | **Comment 1:**We don’t have any agreement on RNTI to be used for SL positioning DCI. Suggest not to reuse the existing RNTI name, as follows.SL-CS-RNTI 🡪 SL-XX-RNTISL-RNTI 🡪 SL-YY-RNTI[Chengyan]: I can understand the concern of using the same SL-RNTI/SL-CS-RNTI although the editor note clarified this is just temporary and does not prevent the further update once RAN1 progresses in the relevant discussion, e.g., the size alignment and the differentiation from SL communication. I would tentatively use XX-RNTI and YY-CS-RNTI here for now.  **Comment 2:**We’re fine with the current text in Table 8.4.1.4-1. |
| ZTE2 | 1. We share similar view as Sharp’s comment 1 and agree to change the section title to “7.3.1.4.3 Format 3\_x”. Further update can be made this if there is related RAN1 agreement in further meeting.

[Chengyan]: Please check the response to Sharp. 1. Regarding the “configuration index” field in section 7.3.1.4.3, the last “SL-CS-RNTI” should be changed to “SL-RNTI” as follows (reason: in SL communication, for dynamic grant, i.e., SL-RNTI, the field “configuration index” is reserved; for configured grant type 2, i.e., SL-CS-RNTI, this field can either be 3 bit or 0 bit):

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| - Configuration index – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled by SL-CS-RNTI; otherwise 3 bitsas defined in clause *XYZ* of [6, TS 38.214]. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL- RNTI.  |

 [Chengyan]: Yes, it is a typo, will be corrected. Or if two new RNTI (e.g., SL-XX-RNTI, SL-XX-CS-RNTI) are introduced for scheduling SL PRS in dedicated resource pool, we can update the spec as follows

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| The following information is transmitted by means of the DCI format 3\_2 with CRC scrambled by SL-XX-RNTI or SL-XX-CS-RNTI: - Configuration index – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled by SL-XX-CS-RNTI; otherwise 3 bitsas defined in clause *XYZ* of [6, TS 38.214]. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-XX-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-XX- RNTI.  |
| [Chengyan]: Please check the response to LGE. RAN1 can further discuss the size alignment for DCI 3\_2 and the necessity of defining new RNTI. |

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| Nokia, NSB | 1. Clause 7.3.1.4.3, field Configuration index: “field is reserved for DCI format 3\_2 with CRC scrambled by SL-CS-RNTI” should be changed to “field is reserved for DCI format 3\_2 with CRC scrambled by SL-RNTI”

[Chengyan]: Yes it is a typo. Per the response to LG, now XX-RNTI and YY-RNTI will be used for now. 1. multiple instances of “number of SL PRS resources in … pool” – these should all be changed to “number of SL PRS resources in a slot of … pool” for clarity.

[Chengyan]: Yes, as responded to others, ‘within a slot’ will be added. 1. Clause 8.4.4: Agree with OPPO#3, configured value for N\_symb^(SL PRS) applies only for SCI format 2-D, for other 2nd stage SCI formats 0 is used.

[Chengyan]: Yes. Will be clarified in the updated version. Regarding vivo’s 1st comment, we disagree with vivo and think that the current text is correct. The relevant agreement reads “Resource pool index – number of bits same to SL communications”. Same number of bits can be ensured only if the same set of pools is counted. [Chengyan]: Please check the response to vivo also. Regarding DCI format 3\_2: We are fine with introducing a new DCI format and think that this decision can be left to the spec editor. |
| Vivo 2 | For the first comment in the previous round, we would like to further clarify our understanding that DCI 3\_2 is used for the scheduling SL PRS in the dedicated RP based on the agreement. So, we think the “I” is the number of dedicated RP.

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| AgreementIn resource allocation in scheme 1, for a dedicated resource pool * in the DCI, introduce at least the following fields:
	+ Resource pool index – number of bits same to SL communications
	+ Time gap - 3 bits
	+ SCI format 1-B fields:
		- Time resource assignment for SL-PRS future reservation(s)
		- SL-PRS resource ID (s) for the future 1 or 2 reservations
	+ SL-PRS resource ID for the first SL-PRS transmission
	+ Configuration index – number of bits same to SL communications
	+ Padding bits, if required
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But, considering the different view about the issue, we are okay to put the last part after high layer parameter as bracket.

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| Resource pool index – bits, where *I* is the total number of resource pools for transmission configured by the higher layer parameter [*sl-TxPoolScheduling*, if configured, and *sl-DiscTxPoolScheduling*, if configured].[Chengyan]: Please check the response to vivo above. The parameter is tentatively removed now and can be further updated later. |

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# Second round discussions

TBD