3GPP TSG-RAN WG2 109bis-e R2-200xxxx

Electronic Meeting, 20th – 30th April, 2020

Agenda Item: 6.0.1

Source: Huawei, HiSilicon, Samsung, Intel Cooperation

Title: [AT109bis-e][068][NR RIL] DiscMail4 (Huawei)

Document for: Discussion, Decision

# Introduction

This is the summary for the RILs and tdocs submitted for agenda item 6.0.1 for various corrections for *SRS-config*. The List of RILs include H230, S653, H005, H062, H063, H064, H065, H066, H071, H070, S654, and I668. The list of CRs submitted under this summary includes

[R2-2003632](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003632.zip) [H062][H065] DraftCR for slotOffset for aperiodic SRS Huawei, HiSilicon draftCR Rel-16 38.331 16.0.0 NR\_pos-Core Late

[R2-2003633](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003633.zip) [H063][H066][H070][H071] DraftCR for the configuration of spatial relation for SRS with SSB Huawei, HiSilicon draftCR Rel-16 38.331 16.0.0 NR\_pos-Core Late

While in this summary, we are only going to discuss the RIL issues highlighted in yellow, due to the following reasons:

* H005 with draft CR R2-2003628, already treated in the main session with the following agreement

|  |
| --- |
| [R2-2003628](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_109bis-e%5CDocs%5CR2-2003628.zip) [H005] Discussion on delta signaling without AddModList Huawei, HiSilicon discussion Rel-16 LateDISCUSSION- Ericsson and Intel thin indeed M shold be avoided for elements in list. * Follow the R15 principle that we will avoid using Need M within lists without an AddMod structure.
 |

* The following RIL has been submitted while the tdoc has not been submitted, hence, propose to treat the issue in the future when the tdoc is ready

H230 R2-2003714 DiscMail4 Extension of a single Need M item to a list of this item is a generic issue that needs to be discussed in ASN.1 session.

# Discussions

## S653

In S653, it is mentioned that the current SRS-config has the following issue

List other than ToAddModList structure using Need M is not recommended though it can be interpreated as Need R.

and the following change is proposed:

Change the need code from Need M to Need R.

Looking at the details of *SRS-config*, the following fields seem to have the above issues.

=====================FIRST CHANGE================================================

SRS-ResourceSet ::= SEQUENCE {

====omitted==========

 [[

 pathlossReferenceRS-List-r16 SEQUENCE (SIZE(1..maxNrofSRS-PathlossReferenceRS-r16-1)) OF PathlossReferenceRS-Config

 OPTIONAL -- Need R

 ]]

}

====================FIRST CHANGE===============================================

SRS-PosResourceSet-r16 ::= SEQUENCE {

====OMITTED=========

 resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 aperiodicSRS-ResourceTriggerList-r16 SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-1))

 OF INTEGER (1..maxNrofSRS-TriggerStates-1) OPTIONAL, -- Need R

 slotOffset-r16 INTEGER (1..32) OPTIONAL, -- Need S

 ...

 },

 semi-persistent-r16 SEQUENCE {

 ...

 },

 periodic-r16 SEQUENCE {

 ...

 }

 },

=====OMITTED==

}

====================END OF FIRST CHANGE=======================================

***Question1: Do companies agree that for the fields pathlossReferenceRS-List and aperiodicSRS-ResourceTriggerList, need code should be changed from needM to needR?***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes |  |
| OPPO | Yes |  |
| Huawei, HiSIlicon | Yes | This is aligned with the agreement on H005* Follow the R15 principle that we will avoid using Need M within lists without an AddMod structure.
 |
| Ericsson | No for pathlossreferencelist | In eMIMO WI draft CR the pathlossReferenceRS-List has been replaced by toaddmodlist structure in order to incorporate also a pathlossresourceID indicated in RAN1 excel and used in a MAC CE. |
| CATT | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes |  |

Most companies except for one says yes to the above question. Hence, we propose the following:

***Proposal1: For the fields pathlossReferenceRS-List and aperiodicSRS-ResourceTriggerList, need code should be changed from needM to needR***

## H063

In H603, the following issue is discussed about the spatial relation configuration for positioning SRS.

Neither ssb-Index-16 (missing “r” by the way) nor ssb-r16 have a field description, and with such naming is not possible to understand that ssb-Index-r16 refers to the serving cell while ssb-r16 refers to a non-serving cell. Besides, all the CHOICEs here are also used in referenceSignal-r16 in SRS-SpatialRelationInfoPos-r16, for the same meaning, but with different names.

Then, in R2-2003633, the following change is proposed:

|  |
| --- |
| Besides, all the CHOICEs here are also used in referenceSignal-r16 in SRS-SpatialRelationInfoPos-r16, for the same meaning, but with different names. One approach to address the current issue is to align the field names under pathloss referenceRS with the other names with the same meaning. Hence, we propose the follows:**Proposal 5: Change the name of the field ssb-Index-r16 to ssb-IndexServing-r16 and ssb-r16 to ssb-IndexNCell. Change in the field description the field name ssb-IndexServingCell to ssb-IndexServing.****Proposal 6: Add field description for ssbNCell.** |

=========================SECOND CHANGE=========================================

SRS-PosResourceSet-r16 ::= SEQUENCE {

=====omitted===

pathlossReferenceRS-Pos-r16 CHOICE {

 ssb-IndexServing-16 SSB-Index,

 csi-RS-Index-r16 NZP-CSI-RS-ResourceId,

 ssb-Ncell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

} OPTIONAL, -- Need M

==omitted====

==========================SECOND CHANGE=========================================

|  |
| --- |
| ***ssb-IndexSeving***Indicates SSB index belonging to a serving cell |

==========================SECOND CHANGE=========================================

|  |
| --- |
| ***srs-ResourceSetToReleaseListForDCI-Format0-2***List of SRS resource set to be released for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***ssb-Ncell***This field indicates a SSB configuration from neighboring cell.  |
| ***transmissionComb***Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1). |

========================END OF SECOND CHANGE===================================

***Question2: Do companies agree to hange the name of the field ssb-Index-r16 to ssb-IndexServing-r16 and ssb-r16 to ssb-Ncell, change in the field description the field name ssb-IndexServingCell to ssb-IndexServing and add field description for ssb-Ncell?***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes | *SRS-PosResourceSet-r16* is configured per UL BWP per seving cell. So for *ssb-IndexServing*, it is more appropriate to state “Indicates SSB index belonging to **the** serving cell. |
| Ericsson | Yes | *Agree with QC comment above* |
| OPPO | Yes |  |
| Huawei, HiSilicon | Yes | Ok with QC proposal.  |
| CATT | Yes |  |
| MediaTek | Yes | The editorial error (missing ‘r’ in ssb-IndexServing-16) should be fixed at the same time. |
| Intel | Yes | Agree with QC’s comments.  |

Based on the above opinions from different companies, we think the following can be proposed:

***Proposal 2: Change the name of the field ssb-Index-r16 to ssb-IndexServing-r16 and ssb-r16 to ssb-Ncell, change in the field description the field name ssb-IndexServingCell to ssb-IndexServing and add field description for ssb-Ncell***

## H064

In H064, the following suggestion is made:

Suggest adding extension markers in freqHopping-r16 after c-SRS-r16.

Based on the above suggestion, the following change can be made based on the existing text.

===================================THIRD CHANGE==================================

SRS-PosResource ::= SEQUENCE {

=====OMITTED====

freqHopping-r16 SEQUENCE {

 c-SRS-r16 INTEGER (0..63),

 },

 =====OMITTED===

}

==========================END OF THIRD CHANGE====================================

***Question3: Do companies agree that extension marker can be added after c-SRS within the field freqHopping?***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes | This should have been the intention. Otherwise it does not make sense to have a single INTEGER being encapsulated in a SEQUENCE. |
| OPPO | Yes |  |
| Huawei, HiSilicon | Yes | Should be future-proof |
| MediaTek | Yes |  |
| Intel | Yes |  |

Based on the above opinions, we can propose the follows:

***Proposal3: Extension marker is added after c-SRS within the field freqHopping***

## H062/H065

In H065, the issue with the location of *slotOffset* is discussed.

As RAN1 LS indicated that the slot offset for AP SRS triggering for positioning SRS is per SRS resource [2].

|  |
| --- |
| Agreement:Add the parameter slot offset for an SRS resource when SRS is configured with the higher layer parameter [SRS-for-positioning] and when the higher layer parameter resourceType in SRS-Resource is set to ‘aperiodic’.* Send an LS to RAN2 to inform of the update of higher layer parameters
 |

Hence, in order to support the new feature, the current RRC configuration of aperiodic SRS should be changed. In particular, the field *slotOffset-r16* should be moved from under *SRS-PosResourceSet* to under *SRS-PosResource*. In R2-2003632, the following proposals are given.

|  |
| --- |
| **Proposal 1: Move the field *slotOffset-r16* from *SRS-PosResourceSet* to *SRS-PosResource*.****Proposal 2: Add the field description of *slotOffset-r16* in *SRS-PosResource*** |

Also with a text proposal is given.

==================================FOURTH CHANGE================================

SRS-PosResourceSet-r16 ::= SEQUENCE {

===OMITTED====

resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 aperiodicSRS-ResourceTriggerList-r16 SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-1))

 OF INTEGER (1..maxNrofSRS-TriggerStates-1) OPTIONAL, -- Need M

 …

 },

 semi-persistent-r16 SEQUENCE {

 ...

 },

 periodic-r16 SEQUENCE {

 ...

 }

=====OMITTED===

}

===============================FOURTH CHANGE===================================

SRS-PosResource-r16::= SEQUENCE {

====OMITTED== resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 slotOffset-r16 INTEGER (1..32) OPTIONAL, -- Need S

 ...

 },

 semi-persistent-r16 SEQUENCE {

 periodicityAndOffset-sp-r16 SRS-PeriodicityAndOffset-r16,

 ...

 },

 periodic-r16 SEQUENCE {

 periodicityAndOffset-p-r16 SRS-PeriodicityAndOffset-r16,

 ...

 },

=====OMITTED===

}

===========================END OF THE FOURTH CHANGE===========================

***Question4: Do companies agree that the field slotOffset should be moved from SRS-PosResourceSet to SRS-PosResource?***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes |  |
| Ericsson | Yes | This is as per RAN1 LS; we agree to the change. |
| OPPO | Yes |  |
| Huawei, HiSilicon | Yes | This is aligned with RAN1 LS.  |
| CATT | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes |  |

Base on the majority of the views, we can propose the following:

***Proposal4: The field slotOffset is moved from SRS-PosResourceSet to SRS-PosResource***

## H066

We noticed that the servingCellId is an optional field, Need S, under the *SRS-SpatialRelationInfoPos-r16*, which is inherited from Rel-15 *SRS-SpatialRelationInfo* IE. While for the current field description of servingCellId, no UE behaviour is given if the field is absent.

SRS-SpatialRelationInfoPos-r16 ::= SEQUENCE {

 servingCellId-r16 ServCellIndex OPTIONAL, -- Need S

 referenceSignal-r16 CHOICE {

 ssb-IndexServing-r16 SSB-Index,

 csi-RS-IndexServing-r16 NZP-CSI-RS-ResourceId,

 srs-SpatialRelation-r16 SEQUENCE {

 resourceSelection-r16 CHOICE {

 srs-ResourceId-r16 SRS-ResourceId,

 srs-PosResourceId-r16 SRS-PosResourceId-r16

 },

 uplinkBWP-r16 BWP-Id

 },

 ssbNcell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

 }

}

Furthermore, for R16 positioning, following reference signals can serve as the source for the spatial relation information for R15/R16 SRS in R16 positioning:

* R16 SRS
	+ SSB from serving cell and non-serving cell;
	+ NZP CSI-RS resource from serving cell;
	+ SRS resource;
	+ SRS-for-positioning resource;
	+ DL-PRS from serving and non-serving cell.
* R15 SRS
	+ SSB from serving cell ~~and non-serving cell~~;
	+ NZP CSI-RS resource from serving cell;
	+ SRS resource;

The problem is that there is no field description even in Rel-15, associated with the Need S code. What further complicates the issue is that SRS-SpatialRelationInfoPos may contain reference signals from neighbouring cells, in which case *servingCellId* may not be needed.

Therefore, a field description is required to fix this issue and the following proposals are given in R2-2003633

|  |
| --- |
| **Proposal 1: Change ‘Need S’ of servingCellId to ‘Cond nonNeighSSBorPRS’ and add a description for the conditional presence tag ‘nonNeighSSBorPRS’: When the field *ssbNCell* or *dl-PRS* is configured, this field is absent; otherwise, need S.****Proposal 2: Add the following field description for the *servingCellId* of *SRS-SpatialRelationInfoPos*-r16 in case it is absent: If this field is absent, and if *ssb-IndexServing-r16*, *csi-RS-IndexServing-r16*, or *srs-SpatialRelation-r16* is configured, the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured.** |

Based on the above proposal, the following change has been given.

===============================FIFTH CHANGE=====================================

SRS-SpatialRelationInfoPos-r16 ::= SEQUENCE {

 servingCellId-r16 ServCellIndex OPTIONAL, -- Cond NeighSSBorCSIRSorSRS

 referenceSignal-r16 CHOICE {

 ssb-IndexServing-r16 SSB-Index,

 csi-RS-IndexServing-r16 NZP-CSI-RS-ResourceId,

 srs-SpatialRelation-r16 SEQUENCE {

 resourceSelection-r16 CHOICE {

 srs-ResourceId-r16 SRS-ResourceId,

 srs-PosResourceId-r16 SRS-PosResourceId-r16

 },

 uplinkBWP-r16 BWP-Id

 },

 ssbNcell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

 }

}

================================FIFTH CHANGE====================================

|  |
| --- |
| ***servingCellId***The serving Cell ID of the source SSB, CSI-RS, or SRS for the spatial relation of the target SRS resource. If this field is absent, and if *ssb-IndexServing-r16*, *csi-RS-IndexServing-r16*, or *srs-SpatialRelation-r16* is configured, the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured. |

===============================FIFTH CHAGNE==================================

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Setup* | This field is mandatory present upon configuration of *SRS-ResourceSet* or *SRS-Resource* and optionally present, Need M, otherwise. |
| *NonCodebook* | This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent. |
| *Pathloss* | The field is mandatory present if *pathlossReferenceRS-Pos* is included; otherwise it is optionally present, Need R. |
| *nonNeighSSBorPRS* | The field is present when SSB or CSI-RS or SRS from the neighbouring cell is configured; Otherwise, it is absent, need S. |

===========================END OF THE FIFTH CHANGE============================

***Question5： Do companies think the following change is agreeable?***

* ***Change ‘Need S’ of servingCellId to ‘Cond nonNeighSSBorPRS’ and add a description for the conditional presence tag ‘nonNeighSSBorPRS’: When the field ssbNCell or dl-PRS is configured, this field is absent; otherwise, need S.***
* ***Add the following field description for the servingCellId of SRS-SpatialRelationInfoPos-r16 in case it is absent: If this field is absent, and if ssb-IndexServing-r16, csi-RS-IndexServing-r16, or srs-SpatialRelation-r16 is configured, the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured.***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes | Note that the condition name in the ASN.1 example above is not in line with the proposals. |
| Ericsson | No | The immediate above ASN.1 is for Rel-15; so that cannot be changed.We presume the intention is for this below Rel-16:SRS-SpatialRelationInfoPos-r16 ::= SEQUENCE { servingCellId-r16 ServCellIndex OPTIONAL, -- Need S referenceSignal-r16 CHOICE { ssb-IndexServing-r16 SSB-Index, csi-RS-IndexServing-r16 NZP-CSI-RS-ResourceId, srs-SpatialRelation-r16 SEQUENCE { resourceSelection-r16 CHOICE { srs-ResourceId-r16 SRS-ResourceId, srs-PosResourceId-r16 SRS-PosResourceId-r16 }, uplinkBWP-r16 BWP-Id }, ssbNcell-r16 SSB-InfoNcell-r16, dl-PRS-r16 DL-PRS-Info-r16 }}However, Instead of adding new condition: It can still be Need S.It can be added in field description saying; if this field is absent, UE may assume that Spatial relation configuration is provided for non serving cell.***servingCellId***Indicates the serving Cell ID. If this field is absent, UE may assume that Spatial relation configuration is provided for non serving cell.Thus when serving cell SSB index, CSI-RS index etc. are provided, the serving cell ID can also be provided. |
| OPPO | Yes to P2, comment to P1 | For P1:In the TP, the condition for ASN.1 is “NeighSSBorCSIRSorSRS”, which is different from the one in the proposal / condition-table “*nonNeighSSBorPRS*”, and the description of the condition in propsal “***When the field ssbNCell or dl-PRS is configured, this field is absent; otherwise, need S***” is different from the one in the condition table “The field is present when SSB or CSI-RS or SRS from the neighbouring cell is configured; Otherwise, it is absent, need S.”, we are not sure which one is the intended one.We are fine with the wording in the proposal: “- Change ‘Need S’ of servingCellId to ‘Cond nonNeighSSBorPRS’ and add a description for the conditional presence tag ‘nonNeighSSBorPRS’: When the field ssbNCell or dl-PRS is configured, this field is absent; otherwise, need S.” |
| Huawei, HiSIlicon | Yes | Agree with QC and OPPO that there are some mistakes in the current proposed CR. * The conditional presence tag should be *nonNeighSSBorPRS*
* In the description for the conditional presence tag, another condition should be added: “if ssb-IndexServing, or csi-RS-IndexServing, or srs-SpatialRelation is configured, the field is optinally present, need S
* The ‘–r16’ should be removed in the field citation
* The last condition should be “Otherwise, the field is absent. “
 |
| Ericsson |  | Questions1) Is the change (adding new condition) intended to legacy servingCellId field as well or only for Rel-16? Due to backward compatibilty issue the change can’t be done for legacy. It is good to confirm the intention here.[HW] The chagne is made to SpatialRelationInfoPos-r16, So there is no backward compatibility issue. I have updated the proposed change to align with the first comment from E// above2) Why can’t this be resolved without having conditional presence? It is not clear. We just need to have the field description and specify what should be the UE behaviour when it is absent. In this case, UE should assume that it is non serving cell configuration or configuration which does not need serving cell indication (in IEs *SRS-SpatialRelationInfoPos* or *SRS-SpatialRelationInfo)*.[HW] That is also another option. But we think with conditional presence tag, it can more clearly spacify when the field should be mandatory, otpional or absent, etc.  |
| CATT | Yes | Support in principle. But note: the modification of ASN.1 doesn’t align with the question5. |
| MediaTek | Yes to P2, yes to P1 as modified above | The principle of the changes is right, but we agree with the changes described by OPPO and Huawei.We think the conditional presence description is clearer than just having an unadorned “Need S”. |
| Intel | Yes | Agree the changes proposed by Huawei in the comments.  |

Based on the above opinions, we propose the following:

***Proposal5: Make the following change to the field servingCellId inside SRS-SpatialRelationInfoPos***

* ***Change ‘Need S’ of servingCellId to ‘Cond nonNeighSSBorPRS’ and add a description for the conditional presence tag ‘nonNeighSSBorPRS’:***
	+ ***if ssb-IndexServing, or csi-RS-IndexServing, or srs-SpatialRelation is configured, the field is optionally present, need S***
	+ ***if SSB or PRS from the neighbouring cell is configured, the field is absent;***
* ***Add the following field description for the servingCellId of SRS-SpatialRelationInfoPos-r16 in case it is absent:***
	+ ***If this field is absent, and if ssb-IndexServing-r16, csi-RS-IndexServing-r16, or srs-SpatialRelation-r16 is configured, the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured.***

## H070/H071/I668

The current conditional tag for Pathloss is used for the following two fields, with the following field descriptions.

SSB-Configuration-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 halfFrameIndex-r16 ENUMERATED {zero, one},

 ssbSubcarrierSpacing-r16 SubcarrierSpacing,

 ssb-periodicity-r16 ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2,spare1 } OPTIONAL, -- Need S

 smtc-r16 SSB-MTC OPTIONAL, -- Need S

 sfn-Offset-r16 INTEGER (0..maxNrofFFS-r16),

 sfn-SSB-Offset-r16 INTEGER (0..15),

 ss-PBCH-BlockPower-r16 INTEGER (-60..50) OPTIONAL -- Cond Pathloss

}

DL-PRS-Info-r16 ::= SEQUENCE {

 trp-Id-r16 INTEGER (0..255),

 dl-PRS-ResourceSetId-r16 INTEGER (0..7),

 dl-PRS-ResourceId-r16 INTEGER (0..63) OPTIONAL -- Cond Pathloss

}

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *Setup* | This field is mandatory present upon configuration of *SRS-ResourceSet* or *SRS-Resource* and optionally present, Need M, otherwise. |
| *NonCodebook* | This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent. |
| *Pathloss* | The field is mandatory present if *pathlossReferenceRS-Pos* is included; otherwise it is optionally present, Need R |

First, we think that it does not make much sense to make *dl-PRS-ResourceId* conditionally present only when it is used for pothloss, as *dl-PRS-ResourceId* may only be used to configure the spatial relation of an SRS resource.

Second, the explanation itself is not clear as well even for *ss-PBCH-BlockPower*. The Tx power of an SSB is only useful when the SSB is used for the pathloss reference for the SRS.

Based on the above discussions, the following proposals have been given in R2-2003633

|  |
| --- |
| **Proposal 3: Remove “Cond PathLoss” from *dl-PRS-ResourceId*,** **Proposal 4: Change the explanation of *Pathloss*: The field is mandatory present if the IE *SSB-InfoNcell-r16* is included in *pathlossReferenceRS-Pos;* otherwise it is absent.** |

==================================SIXTH CHANGE OPT1==============================

DL-PRS-Info-r16 ::= SEQUENCE {

 trp-Id-r16 INTEGER (0..255),

 dl-PRS-ResourceSetId-r16 INTEGER (0..7),

 dl-PRS-ResourceId-r16 INTEGER (0..63) OPTIONAL -- Need R

}

=================================SIEXTH CHANGE OPT1=============================

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Setup* | This field is mandatory present upon configuration of *SRS-ResourceSet* or *SRS-Resource* and optionally present, Need M, otherwise. |
| *NonCodebook* | This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent. |
| *Pathloss* | The field is mandatory present if the IE *SSB-InfoNcell* is included in *pathlossReferenceRS-Pos*; otherwise it is optionally present, Need R. |

================================END OF THE SIXTH CHANGE OPT1====================

While in 1.1 I668, the following discussion has been given:

Conditional presence as captured here does not seem right as it is written depending on presence of pathlossReferenceRS-Pos which is itself a Need M field and hence may not be present during delta configuration – unless it is really intended to be included when pathlossReferenceRS-Pos is configured the first time. Even then, this usage makes it mandatory to include this field whenever pathlossReferenceRS-Pos is not present due to delta signalling. Better to clarify in field description when network should configure the field.

And the following change has been proposed:

Change condition to be not dependent on presence of pathlossReferenceRS-Pos but on its configuration and could also consider moving to field description.

We think the comment in I668 is aligned with the proposed change in H070/071.

***Question6: Do companies agree with the following changes and are they aligned with the proposal in I668?***

* ***Remove “Cond PathLoss” from dl-PRS-ResourceId,***
* ***Change the explanation of Pathloss: The field is mandatory present if the IE SSB-InfoNcell-r16 is included in pathlossReferenceRS-Pos; otherwise it is absent.***

|  |  |  |
| --- | --- | --- |
| Company | Option1/2 | Comments |
| Qualcomm Incorporated | Yes |  |
| Ericsson | Yes | As per H070 and I688; the correct interpretation is thatRemove “Cond PathLoss” from *dl-PRS-ResourceId* and change it to OPTIONAL NEED R. This is also mentioned in the conclusion section R2-2003633. We agree to this. |
| OPPO | Yes with comment | We agree that removing the dependency on pathloss reference since it is also useful for spatial relation, but it is suspicious why it is to be optional with need-R, it seems to imply a scenario where the “DL-PRS-Info-r16” is configured by “dl-PRS-ResourceId-r16” is released, can the proponent clarify the scenario? Or what is the problem if make this field mandatory (in other words, what is the benefit to make this field optional?) |
| Huawei, HiSilicon | Yes | In response to Oppo’s question, it is a good question and the reason why it can be optional is because, in positinoing, not send the resource id to the UE is a natural way to do it such that the UE can do its own detection and find out what is the best reception beam within the resource set.  |
| CATT | Yes | There is no Option1/2 in the question6. So we list what we support here:***Remove “Cond PathLoss” from dl-PRS-ResourceId,*** ***Change the explanation of Pathloss in*** ***ss-PBCH-BlockPower-r16 : The field is mandatory present if the IE SSB-InfoNcell-r16 is included in pathlossReferenceRS-Pos; otherwise it is absent.*** |
| MediaTek | Yes |  |
| Intel | Yes |  |

Based on the above opinions, we propose the following:

***Proposal6: Make the following change for the field dl-PRS-ResourceId and the conditional presence tag Pathloss:***

* ***Remove “Cond PathLoss” from dl-PRS-ResourceId,***
* ***Change the explanation of Pathloss: The field is mandatory present if the IE SSB-InfoNcell-r16 is included in pathlossReferenceRS-Pos; otherwise it is absent.***

## S654

In S654, the following issues is mentioned:

There is no clarification where both pathlossReferenceRS and pathlossReferenceRS-List-r16 are signalled.

While the LS from RAN1 to RAN2 on eMIMO parameters (R2-1913674) has given a clear description of the field, based on the above mentioned issue, the propose change to the spec should be:

===============================SEVENTH CHANGE==================================

|  |
| --- |
| ***pathlossReferenceRS***A reference signal (e.g. a CSI-RS config or a SS block) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). When the field *pathlossReferenceRS-List* is present, this field should be absent.  |
| ***pathlossReferenceRS-List***Multiple candidate pathloss reference RS(s) for SRS power control, where one of the candidate RS(s) can be activated/updated for a SRS resource set via MAC CE. When the field *pathlossReferenceRS* is present, this field should be absent.  |
| ***pathlossReferenceRS-Pos***A reference signal (e.g. a CSI-RS config or a SS block or a DL PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |

===============================END OF THE SEVENTH CHAGNE========================

***Question7: Do companies agree that field description for pathlossReferecenRS-List should be added and the two fields pathlossReferecneRS and pathlossReferenceRS-List should not be present at the same time?***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm Incorporated | Yes |  |
| OPPO | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Ericsson | No  | In eMIMO WI draft CR the pathlossReferenceRS-List has been replaced by toaddmodlist structure in order to incorporate also a pathlossresourceID indicated in RAN1 excel and used in a MAC CE. |
| CATT | Yes |  |
| MediaTek | Yes | Considering Ericsson’s comment it seems that some harmonisation with the eMIMO CR would be needed, but the principle still seems right that we would not provide both pathlossReferenceRS and the list at the same time. |
| Intel | Yes |  |

Based on the above opinions: we propose the following:

***Proposal7: The field description for pathlossReferecenRS-List should be added and the two fields pathlossReferecneRS and pathlossReferenceRS-List should not be present at the same time***

# Conclusion

Based on the above summary, we propose the following that can be discussed during the online session in RAN2#109bis-e:

***Proposal1: For the fields pathlossReferenceRS-List and aperiodicSRS-ResourceTriggerList, need code should be changed from needM to needR***

***Proposal 2: Change the name of the field ssb-Index-r16 to ssb-IndexServing-r16 and ssb-r16 to ssb-Ncell, change in the field description the field name ssb-IndexServingCell to ssb-IndexServing and add field description for ssb-Ncell***

***Proposal3: Extension marker is added after c-SRS within the field freqHopping***

***Proposal4: The field slotOffset is moved from SRS-PosResourceSet to SRS-PosResource***

***Proposal5: Make the following change to the field servingCellId inside SRS-SpatialRelationInfoPos***

* ***Change ‘Need S’ of servingCellId to ‘Cond nonNeighSSBorPRS’ and add a description for the conditional presence tag ‘nonNeighSSBorPRS’:***
	+ ***if ssb-IndexServing, or csi-RS-IndexServing, or srs-SpatialRelation is configured, the field is optionally present, need S***
	+ ***if SSB or PRS from the neighbouring cell is configured, the field is absent;***
* ***Add the following field description for the servingCellId of SRS-SpatialRelationInfoPos-r16 in case it is absent:***

***If this field is absent, and if ssb-IndexServing-r16, csi-RS-IndexServing-r16, or srs-SpatialRelation-r16 is configured, the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured.Proposal6: Make the following change for the field dl-PRS-ResourceId and the conditional presence tag Pathloss:***

* ***Remove “Cond PathLoss” from dl-PRS-ResourceId,***
* ***Change the explanation of Pathloss: The field is mandatory present if the IE SSB-InfoNcell-r16 is included in pathlossReferenceRS-Pos; otherwise it is absent.***

***Proposal7: The field description for pathlossReferecenRS-List should be added and the two fields pathlossReferecneRS and pathlossReferenceRS-List should not be present at the same time***

# Text Proposal

– *SRS-Config*

The IE *SRS-Config* is used to configure sounding reference signal transmissions or to configure sounding reference signal measurements for CLI. The configuration defines a list of SRS-Resources and a list of SRS-ResourceSets. Each resource set defines a set of SRS-Resources. The network triggers the transmission of the set of SRS-Resources using a configured aperiodicSRS-ResourceTrigger (L1 DCI).

***SRS-Config* information element**

-- ASN1START

-- TAG-SRS-CONFIG-START

SRS-Config ::= SEQUENCE {

 srs-ResourceSetToReleaseList SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId OPTIONAL, -- Need N

 srs-ResourceSetToAddModList SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet OPTIONAL, -- Need N

 srs-ResourceToReleaseList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-ResourceId OPTIONAL, -- Need N

 srs-ResourceToAddModList SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-Resource OPTIONAL, -- Need N

 tpc-Accumulation ENUMERATED {disabled} OPTIONAL, -- Need S

 ...,

 [[

 srs-RequestForDCI-Format1-2-r16 INTEGER (1..2) OPTIONAL, -- Need S

 srs-RequestForDCI-Format0-2-r16 INTEGER (1..2) OPTIONAL, -- Need S

 srs-ResourceSetToAddModListForDCI-Format0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet OPTIONAL, -- Need N

 srs-ResourceSetToReleaseListForDCI-Format0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId OPTIONAL,-- Need N

 srs-PosResourceSetToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSetId-r16

 OPTIONAL, -- Need N

 srs-PosResourceSetToAddModList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSet-r16 OPTIONAL,-- Need N

 srs-PosResourceToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16 OPTIONAL,-- Need N

 srs-PosResourceToAddModList-r16 SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResource-r16 OPTIONAL -- Need N

 ]]

}

SRS-ResourceSet ::= SEQUENCE {

 srs-ResourceSetId SRS-ResourceSetId,

 srs-ResourceIdList SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-ResourceId OPTIONAL, -- Cond Setup

 resourceType CHOICE {

 aperiodic SEQUENCE {

 aperiodicSRS-ResourceTrigger INTEGER (1..maxNrofSRS-TriggerStates-1),

 csi-RS NZP-CSI-RS-ResourceId OPTIONAL, -- Cond NonCodebook

 slotOffset INTEGER (1..32) OPTIONAL, -- Need S

 ...,

 [[

 aperiodicSRS-ResourceTriggerList SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-2))

 OF INTEGER (1..maxNrofSRS-TriggerStates-1) OPTIONAL -- Need M

 ]]

 },

 semi-persistent SEQUENCE {

 associatedCSI-RS NZP-CSI-RS-ResourceId OPTIONAL, -- Cond NonCodebook

 ...

 },

 periodic SEQUENCE {

 associatedCSI-RS NZP-CSI-RS-ResourceId OPTIONAL, -- Cond NonCodebook

 ...

 }

 },

 usage ENUMERATED {beamManagement, codebook, nonCodebook, antennaSwitching},

 alpha Alpha OPTIONAL, -- Need S

 p0 INTEGER (-202..24) OPTIONAL, -- Cond Setup

 pathlossReferenceRS PathlossReferenceRS-Config OPTIONAL, -- Need M

 srs-PowerControlAdjustmentStates ENUMERATED { sameAsFci2, separateClosedLoop} OPTIONAL, -- Need S

 ...,

 [[

 pathlossReferenceRS-List-r16 SEQUENCE (SIZE(1..maxNrofSRS-PathlossReferenceRS-r16-1)) OF PathlossReferenceRS-Config

 OPTIONAL -- Need R

 ]]

}

PathlossReferenceRS-Config ::= CHOICE {

 ssb-Index SSB-Index,

 csi-RS-Index NZP-CSI-RS-ResourceId

}

SRS-PosResourceSet-r16 ::= SEQUENCE {

 srs-PosResourceSetId-r16 SRS-PosResourceSetId-r16,

 srs-PosResourceIdList-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-PosResourceId-r16

 OPTIONAL, -- Cond Setup

 resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 aperiodicSRS-ResourceTriggerList-r16 SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-1))

 OF INTEGER (1..maxNrofSRS-TriggerStates-1) OPTIONAL, -- Need R

 ...

 },

 semi-persistent-r16 SEQUENCE {

 ...

 },

 periodic-r16 SEQUENCE {

 ...

 }

 },

 alpha-r16 Alpha OPTIONAL, -- Need S

 p0-r16 INTEGER (-202..24) OPTIONAL, -- Cond Setup

 pathlossReferenceRS-Pos-r16 CHOICE {

 ssb-IndexServing-16 SSB-Index,

 csi-RS-Index-r16 NZP-CSI-RS-ResourceId,

 ssb-NCell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

 } OPTIONAL, -- Need M

 ...

}

SRS-ResourceSetId ::= INTEGER (0..maxNrofSRS-ResourceSets-1)

SRS-PosResourceSetId-r16 ::= INTEGER (0..maxNrofSRS-PosResourceSets-1-r16)

SRS-Resource ::= SEQUENCE {

 srs-ResourceId SRS-ResourceId,

 nrofSRS-Ports ENUMERATED {port1, ports2, ports4},

 ptrs-PortIndex ENUMERATED {n0, n1 } OPTIONAL, -- Need R

 transmissionComb CHOICE {

 n2 SEQUENCE {

 combOffset-n2 INTEGER (0..1),

 cyclicShift-n2 INTEGER (0..7)

 },

 n4 SEQUENCE {

 combOffset-n4 INTEGER (0..3),

 cyclicShift-n4 INTEGER (0..11)

 }

 },

 resourceMapping SEQUENCE {

 startPosition INTEGER (0..5),

 nrofSymbols ENUMERATED {n1, n2, n4},

 repetitionFactor ENUMERATED {n1, n2, n4}

 },

 freqDomainPosition INTEGER (0..67),

 freqDomainShift INTEGER (0..268),

 freqHopping SEQUENCE {

 c-SRS INTEGER (0..63),

 b-SRS INTEGER (0..3),

 b-hop INTEGER (0..3)

 },

 groupOrSequenceHopping ENUMERATED { neither, groupHopping, sequenceHopping },

 resourceType CHOICE {

 aperiodic SEQUENCE {

 slotOffset-r16 INTEGER (1..32) OPTIONAL, -- Need S

 ...

 },

 semi-persistent SEQUENCE {

 periodicityAndOffset-sp SRS-PeriodicityAndOffset,

 ...

 },

 periodic SEQUENCE {

 periodicityAndOffset-p SRS-PeriodicityAndOffset,

 ...

 }

 },

 sequenceId INTEGER (0..1023),

 spatialRelationInfo SRS-SpatialRelationInfo OPTIONAL, -- Need R

 ...,

 [[

 resourceMapping-r16 SEQUENCE {

 startPosition-r16 INTEGER (0..13),

 nrofSymbols-r16 ENUMERATED {n1, n2, n4},

 repetitionFactor-r16 ENUMERATED {n1, n2, n4}

 } OPTIONAL -- Need R

 ]]

}

SRS-PosResource-r16::= SEQUENCE {

 srs-PosResourceId-r16 SRS-PosResourceId-r16,

 transmissionComb-r16 CHOICE {

 n2-r16 SEQUENCE {

 combOffset-n2-r16 INTEGER (0..1),

 cyclicShift-n2-r16 INTEGER (0..7)

 },

 n4-r16 SEQUENCE {

 combOffset-n4-16 INTEGER (0..3),

 cyclicShift-n4-r16 INTEGER (0..11)

 },

 n8-r16 SEQUENCE {

 combOffset-n8-r16 INTEGER (0..7),

 cyclicShift-n8-r16 INTEGER (0..5)

 },

 ...

 },

 resourceMapping-r16 SEQUENCE {

 startPosition-r16 INTEGER (0..13),

 nrofSymbols-r16 ENUMERATED {n1, n2, n4, n8, n12}

 },

 freqDomainShift-r16 INTEGER (0..268),

 freqHopping-r16 SEQUENCE {

 c-SRS-r16 INTEGER (0..63),

 ...

 },

 groupOrSequenceHopping-r16 ENUMERATED { neither, groupHopping, sequenceHopping },

 resourceType-r16 CHOICE {

 aperiodic-r16 SEQUENCE {

 ...

 },

 semi-persistent-r16 SEQUENCE {

 periodicityAndOffset-sp-r16 SRS-PeriodicityAndOffset-r16,

 ...

 },

 periodic-r16 SEQUENCE {

 periodicityAndOffset-p-r16 SRS-PeriodicityAndOffset-r16,

 ...

 }

 },

 sequenceId-r16 INTEGER (0..65535),

 spatialRelationInfoPos-r16 SRS-SpatialRelationInfoPos-r16 OPTIONAL, -- Need R

 ...

}

SRS-SpatialRelationInfo ::= SEQUENCE {

 servingCellId ServCellIndex OPTIONAL, -- Cond NonNeighSSBorPRS

 referenceSignal CHOICE {

 ssb-Index SSB-Index,

 csi-RS-Index NZP-CSI-RS-ResourceId,

 srs SEQUENCE {

 resourceId SRS-ResourceId,

 uplinkBWP BWP-Id

 }

 }

}

SRS-SpatialRelationInfoPos-r16 ::= SEQUENCE {

 servingCellId-r16 ServCellIndex OPTIONAL, -- Need S

 referenceSignal-r16 CHOICE {

 ssb-IndexServing-r16 SSB-Index,

 csi-RS-IndexServing-r16 NZP-CSI-RS-ResourceId,

 srs-SpatialRelation-r16 SEQUENCE {

 resourceSelection-r16 CHOICE {

 srs-ResourceId-r16 SRS-ResourceId,

 srs-PosResourceId-r16 SRS-PosResourceId-r16

 },

 uplinkBWP-r16 BWP-Id

 },

 ssbNcell-r16 SSB-InfoNcell-r16,

 dl-PRS-r16 DL-PRS-Info-r16

 }

}

SSB-Configuration-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 halfFrameIndex-r16 ENUMERATED {zero, one},

 ssbSubcarrierSpacing-r16 SubcarrierSpacing,

 ssb-periodicity-r16 ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2,spare1 } OPTIONAL, -- Need S

 smtc-r16 SSB-MTC OPTIONAL, -- Need S

 sfn-Offset-r16 INTEGER (0..maxNrofFFS-r16),

 sfn-SSB-Offset-r16 INTEGER (0..15),

 ss-PBCH-BlockPower-r16 INTEGER (-60..50) OPTIONAL -- Cond Pathloss

}

SSB-InfoNcell-r16 ::= SEQUENCE {

 physicalCellId-r16 PhysCellId,

 ssb-IndexNcell-r16 SSB-Index,

 ssb-Configuration-r16 SSB-Configuration-r16 OPTIONAL -- Need M

}

DL-PRS-Info-r16 ::= SEQUENCE {

 trp-Id-r16 INTEGER (0..255),

 dl-PRS-ResourceSetId-r16 INTEGER (0..7),

 dl-PRS-ResourceId-r16 INTEGER (0..63) OPTIONAL -- Need R

}

SRS-ResourceId ::= INTEGER (0..maxNrofSRS-Resources-1)

SRS-PosResourceId-r16 ::= INTEGER (0..maxNrofSRS-PosResources-1-r16)

SRS-PeriodicityAndOffset ::= CHOICE {

 sl1 NULL,

 sl2 INTEGER(0..1),

 sl4 INTEGER(0..3),

 sl5 INTEGER(0..4),

 sl8 INTEGER(0..7),

 sl10 INTEGER(0..9),

 sl16 INTEGER(0..15),

 sl20 INTEGER(0..19),

 sl32 INTEGER(0..31),

 sl40 INTEGER(0..39),

 sl64 INTEGER(0..63),

 sl80 INTEGER(0..79),

 sl160 INTEGER(0..159),

 sl320 INTEGER(0..319),

 sl640 INTEGER(0..639),

 sl1280 INTEGER(0..1279),

 sl2560 INTEGER(0..2559)

}

SRS-PeriodicityAndOffset-r16 ::= CHOICE {

 sl1 NULL,

 sl2 INTEGER(0..1),

 sl4 INTEGER(0..3),

 sl5 INTEGER(0..4),

 sl8 INTEGER(0..7),

 sl10 INTEGER(0..9),

 sl16 INTEGER(0..15),

 sl20 INTEGER(0..19),

 sl32 INTEGER(0..31),

 sl40 INTEGER(0..39),

 sl64 INTEGER(0..63),

 sl80 INTEGER(0..79),

 sl160 INTEGER(0..159),

 sl320 INTEGER(0..319),

 sl640 INTEGER(0..639),

 sl1280 INTEGER(0..1279),

 sl2560 INTEGER(0..2559),

 sl5120 INTEGER(0..5119),

 sl10240 INTEGER(0..10239),

 sl40960 INTEGER(0..40959),

 sl81920 INTEGER(0..81919),

 ...

}

-- TAG-SRS-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SRS-Config* field descriptions** |
| ***tpc-Accumulation***If the field is absent, UE applies TPC commands via accumulation. If disabled, UE applies the TPC command without accumulation (this applies to SRS when a separate closed loop is configured for SRS) (see TS 38.213 [13], clause 7.3). |

|  |
| --- |
| ***SRS-Resource* field descriptions** |
| ***cyclicShift-n2***Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***cyclicShift-n4***Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***freqHopping***Includes parameters capturing SRS frequency hopping (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, the network always configures this field such that *b-hop* > *b-SRS*. |
| ***groupOrSequenceHopping***Parameter(s) for configuring group or sequence hopping (see TS 38.211 [16], clause 6.4.1.4.2). For CLI SRS-RSRP measurement, the network always configures this parameter to 'neither'. |
| ***nrofSRS-Ports***Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'. |
| ***periodicityAndOffset-p***Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, *sl1280* and *sl2560* cannot be configured. |
| ***periodicityAndOffset-sp***Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). |
| ***ptrs-PortIndex***The PTRS port index for this SRS resource for non-codebook based UL MIMO. This is only applicable when the corresponding *PTRS-UplinkConfig* is set to CP-OFDM. The *ptrs-PortIndex* configured here must be smaller than the *maxNrofPorts* configured in the *PTRS-UplinkConfig* (see TS 38.214 [19], clause 6.2.3.1). This parameter is not applicable to CLI SRS-RSRP measurement. |
| ***resourceMapping***OFDM symbol location of the SRS resource within a slot including *nrofSymbols* (number of OFDM symbols), *startPosition* (value 0 refers to the last symbol, value 1 refers to the second last symbol, and so on) and *repetitionFactor* (see TS 38.214 [19], clause 6.2.1 and TS 38.211 [16], clause 6.4.1.4). The configured SRS resource does not exceed the slot boundary. If *resourceMapping-r16* is signalled, UE shall ignore the *resourceMapping* (without suffix). For CLI SRS-RSRP measurement, the network always configures *nrofSymbols* and *repetitionFactor* to 'n1'. |
| ***resourceType***Periodicity and offset for semi-persistent and periodic SRS resource (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, only 'periodic' is applicable for *resourceType*. |
| ***sequenceId***Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1). |
| ***servingCellId***The serving Cell ID of the source SSB, CSI-RS, or SRS for the spatial relation of the target SRS resource. If this field is absent, and if *ssb-IndexServing*, *csi-RS-IndexServing*, or *srs-SpatialRelation* is configured, the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured. |
| ***spatialRelationInfo***Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS (see TS 38.214 [19], clause 6.2.1). This parameter is not applicable to CLI SRS-RSRP measurement. |
| ***spatialRelationInfoPos***Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS (see TS 38.214 [19], clause 6.2.1). |
| ***srs-RequestForDCI-Format0-2***Indicate the number of bits for "SRS request"in DCI format 0\_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 0\_2 is applied. If the parameter *srs-RequestForDCI-Format0-2* is configured to value 1, 1 bit is used to indicate one of the first two rows of Table 7.3.1.1.2-24 in TS 38.212 [17] for triggered aperiodic SRS resource set. If the value 2 is configured, 2 bits are used to indicate one of the rows of Table 7.3.1.1.2-24 in TS 38.212 [17]. When UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication. |
| ***srs-RequestForDCI-Format1-2***Indicate the number of bits for "SRS request" in DCI format 1\_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 1\_2 is applied. When the UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication (see TS 38.214 [19], clause 6.1.1.2). |
| ***srs-ResourceSetToAddModListForDCI-Format0-2***List of SRS resource set to be added or modified for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***srs-ResourceSetToReleaseListForDCI-Format0-2***List of SRS resource set to be released for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***ssb-Ncell***This field indicates a SSB configuration from neighboring cell. |
| ***transmissionComb***Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1). |

|  |
| --- |
| ***SRS-ResourceSet* field descriptions** |
| ***alpha***alpha value for SRS power control (see TS 38.213 [13], clause 7.3). When the field is absent the UE applies the value 1. |
| ***aperiodicSRS-ResourceTriggerList***An additional list of DCI "code points" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6.1.1.2). When the field is not included during a reconfiguration of *SRS-ResourceSet* of *resourceType* set to *aperiodic*, UE maintains this value based on the Need M; that is, this list is not considered as an extension of *aperiodicSRS-ResourceTrigger* for purpose of applying the general rule for extended list in clause 6.1.3. |
| ***aperiodicSRS-ResourceTrigger***The DCI "code point" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6.1.1.2). |
| ***associatedCSI-RS***ID of CSI-RS resource associated with this SRS resource set in non-codebook based operation (see TS 38.214 [19], clause 6.1.1.2). |
| ***csi-RS***ID of CSI-RS resource associated with this SRS resource set. (see TS 38.214 [19], clause 6.1.1.2). |
| ***csi-RS-IndexServingcell***Indicates CSI-RS index belonging to a serving cell |
| ***dl-PRS-ResourceId***The ID of the DL PRS resource, see TS 37.355 [49] |
| ***dl-PRS-ResourceSetId***The ID of the DL PRS resource set, see TS 37.355 [49] |
| ***halfFrameIndex***Indicates whether SSB is in the first half or the second half of the frame. Value zero indicates the first half and value 1 indicates the second half. |
| ***p0***P0 value for SRS power control. The value is in dBm. Only even values (step size 2) are allowed (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRS***A reference signal (e.g. a CSI-RS config or a SS block) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). When the field *pathlossReferenceRS-List* is present, this field should be absent. |
| ***pathlossReferenceRS-List***Multiple candidate pathloss reference RS(s) for SRS power control, where one of the candidate RS(s) can be activated/updated for a SRS resource set via MAC CE. When the field *pathlossReferenceRS* is present, this field should be absent. |
| ***pathlossReferenceRS-Pos***A reference signal (e.g. a CSI-RS config or a SS block or a DL PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |
| ***resourceSelection***Indicates whether the configured SRS spatial relation resource is a *SRS-Resource* or *SRS-PosResource*. |
| ***resourceType***Time domain behavior of SRS resource configuration, see TS 38.214 [19], clause 6.2.1. The network configures SRS resources in the same resource set with the same time domain behavior on periodic, aperiodic and semi-persistent SRS. |
| ***sfn-SSB-Offset***Indicates the 4 LSBs of the SFN of the cell in which SSB is transmitted |
| ***slotOffset***An offset in number of slots between the triggering DCI and the actual transmission of this *SRS-ResourceSet*. If the field is absent the UE applies no offset (value 0). |
| ***srs-PowerControlAdjustmentStates***Indicates whether hsrs,c(i) = fc(i,1) or hsrs,c(i) = fc(i,2) (if twoPUSCH-PC-AdjustmentStates are configured) or separate close loop is configured for SRS. This parameter is applicable only for Uls on which UE also transmits PUSCH. If absent or release, the UE applies the value sameAs-Fci1 (see TS 38.213 [13], clause 7.3). |
| ***srs-ResourceIdList***The IDs of the SRS-Resources used in this *SRS-ResourceSet*. If this *SRS-ResourceSet* is configured with usage set to codebook, the *srs-ResourceIdList* contains at most 2 entries. If this *SRS-ResourceSet* is configured with *usage* set to *nonCodebook*, the *srs-ResourceIdList* contains at most 4 entries. |
| ***srs-ResourceSetId***The ID of this resource set. It is unique in the context of the BWP in which the parent *SRS-Config* is defined. |
| ***ssb-IndexNcell***Indicates SSB index belonging to a non-serving cell |
| ***ssb-IndexSeving***Indicates SSB index belonging to a serving cell |
| ***trp-Id***indicates the TRP ID, see TS 37.355 [49] |
| ***usage***Indicates if the SRS resource set is used for beam management, codebook based or non-codebook based transmission or antenna switching. See TS 38.214 [19], clause 6.2.1. Reconfiguration between codebook based and non-codebook based transmission is not supported. |
|  |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *Setup* | This field is mandatory present upon configuration of *SRS-ResourceSet* or *SRS-Resource* and optionally present, Need M, otherwise. |
| *NonCodebook* | This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent. |
| *Pathloss* | The field is mandatory present if the IE *SSB-InfoNcell* is included in *pathlossReferenceRS-Pos*; otherwise it is optionally present, Need R. |
| *nonNeighSSBorPRS* | If ssb-IndexServing, or csi-RS-IndexServing, or srs-SpatialRelation is configured, the field is optionally present, need S; Otherwise, if SSB or PRS from the neighbouring cell is configured, the field is absent; |