**3GPP TSG-RAN2 Meeting #126 *R2-240***

**Fukuoka, Japan, 20th - 24th May., 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | 4793 | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Correction to Positioning SRS Configuration | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh2 | | | | |  | ***Date:*** | | | 2024-05-20 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | A |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | For legacy SRS, the range of slotOffset for aperiodic SRS in SRS-ResourceSet is 1..32. In the field description, it explains that value 0 is supported with the absence of the field, which means no offset. From our understanding, the same value range should apply to positoning SRS.  However, in current RRC, for posisitioning SRS, there is no correspondig description when the field slotOffset is absent. In this way, value 0 is not supported for slotOffset for aperiodic positoning SRS in SRS-PosResource due to incomplete field description. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add field description to SRS-PosResource that the absence of slotOffset for aperiodic positoning SRS represents no offset. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | It is not clear what is the offset if the field slotOffset is absent with the need code of the field indicated as Need S. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

=================================================== CHANGE BEGIN ============================================================

#### *–* – *SRS-Config*

The IE *SRS-Config* is used to configure sounding reference signal transmissions. The configuration defines a list of SRS-Resources, a list of SRS-PosResources, a list of SRS-PosResourceSets and a list of SRS-ResourceSets. Each resource set defines a set of SRS-Resources or SRS-PosResources. The network triggers the transmission of the set of SRS-Resources or SRS-PosResources using a configured aperiodicSRS-ResourceTrigger (L1 DCI). The network does not configure SRS specific power control parameters *alpha* (without suffix) or *pathlossReferenceRS* if *unifiedTCI-StateType* is configured for the serving cell.

***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-RequestDCI-1-2-r16 INTEGER (1..2) OPTIONAL, -- Need S

srs-RequestDCI-0-2-r16 INTEGER (1..2) OPTIONAL, -- Need S

srs-ResourceSetToAddModListDCI-0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet OPTIONAL, -- Need N

srs-ResourceSetToReleaseListDCI-0-2-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

]],

[[

dci-TriggeringPosResourceSetLink-r18 ENUMERATED { enabled } OPTIONAL -- Need R

]]

}

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

...,

[[

pathlossReferenceRSList-r16 SetupRelease { PathlossReferenceRSList-r16} OPTIONAL -- Need M

]],

[[

usagePDC-r17 ENUMERATED {true} OPTIONAL, -- Need R

availableSlotOffsetList-r17 SEQUENCE (SIZE(1..4)) OF AvailableSlotOffset-r17 OPTIONAL, -- Need R

followUnifiedTCI-StateSRS-r17 ENUMERATED {enabled} OPTIONAL -- Need R

]],

[[

applyIndicatedTCI-State-r18 ENUMERATED {first, second} OPTIONAL -- Cond FollowUTCI

]]

}

AvailableSlotOffset-r17 ::= INTEGER (0..7)

PathlossReferenceRS-Config ::= CHOICE {

ssb-Index SSB-Index,

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

}

PathlossReferenceRSList-r16 ::= SEQUENCE (SIZE (1..maxNrofSRS-PathlossReferenceRS-r16)) OF PathlossReferenceRS-r16

PathlossReferenceRS-r16 ::= SEQUENCE {

srs-PathlossReferenceRS-Id-r16 SRS-PathlossReferenceRS-Id-r16,

pathlossReferenceRS-r16 PathlossReferenceRS-Config

}

SRS-PathlossReferenceRS-Id-r16 ::= INTEGER (0..maxNrofSRS-PathlossReferenceRS-1-r16)

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 M

...

},

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-r16 SSB-Index,

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 {

...

},

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

]],

[[

spatialRelationInfo-PDC-r17 SetupRelease { SpatialRelationInfo-PDC-r17 } OPTIONAL, -- Need M

resourceMapping-r17 SEQUENCE {

startPosition-r17 INTEGER (0..13),

nrofSymbols-r17 ENUMERATED {n1, n2, n4, n8, n10, n12, n14},

repetitionFactor-r17 ENUMERATED {n1, n2, n4, n5, n6, n7, n8, n10, n12, n14}

} OPTIONAL, -- Need R

partialFreqSounding-r17 SEQUENCE {

startRBIndexFScaling-r17 CHOICE{

startRBIndexAndFreqScalingFactor2-r17 INTEGER (0..1),

startRBIndexAndFreqScalingFactor4-r17 INTEGER (0..3)

},

enableStartRBHopping-r17 ENUMERATED {enable} OPTIONAL -- Need R

} OPTIONAL, -- Need R

transmissionComb-n8-r17 SEQUENCE {

combOffset-n8-r17 INTEGER (0..7),

cyclicShift-n8-r17 INTEGER (0..5)

} OPTIONAL, -- Need R

srs-TCI-State-r17 CHOICE {

srs-UL-TCI-State TCI-UL-StateId-r17,

srs-DLorJointTCI-State TCI-StateId

} OPTIONAL -- Need R

]],

[[

repetitionFactor-v1730 ENUMERATED {n3} OPTIONAL, -- Need R

srs-DLorJointTCI-State-v1730 SEQUENCE {

cellAndBWP-r17 ServingCellAndBWP-Id-r17

} OPTIONAL -- Cond DLorJointTCI-SRS

]],

[[

nrofSRS-Ports-n8-r18 ENUMERATED {ports8, ports8tdm} OPTIONAL, -- Need R

combOffsetHopping-r18 SEQUENCE {

hoppingId-r18 INTEGER (0..1023) OPTIONAL, -- Need R

hoppingSubset-r18 CHOICE {

transmissionComb-n4 BIT STRING (SIZE (4)),

transmissionComb-n8 BIT STRING (SIZE (8))

} OPTIONAL, -- Need R

hoppingWithRepetition-r18 ENUMERATED {symbol, repetition} OPTIONAL -- Need R

} OPTIONAL, -- Need R

cyclicShiftHopping-r18 SEQUENCE {

hoppingId-r18 INTEGER (0..1023) OPTIONAL, -- Need R

hoppingSubset-r18 CHOICE {

transmissionComb-n2 BIT STRING (SIZE (8)),

transmissionComb-n4 BIT STRING (SIZE (12)),

transmissionComb-n8 BIT STRING (SIZE (6))

} OPTIONAL, -- Need R

hoppingFinerGranularity-r18 ENUMERATED {enable} OPTIONAL -- Need R

} 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-r16 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 {

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

...

},

semi-persistent-r16 SEQUENCE {

periodicityAndOffset-sp-r16 SRS-PeriodicityAndOffset-r16,

...,

[[

periodicityAndOffset-sp-Ext-r16 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL -- Need R

]]

},

periodic-r16 SEQUENCE {

periodicityAndOffset-p-r16 SRS-PeriodicityAndOffset-r16,

...,

[[

periodicityAndOffset-p-Ext-r16 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL -- Need R

]]

}

},

sequenceId-r16 INTEGER (0..65535),

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

...,

[[

srs-PosPeriodicConfigHyperSFN-Index-r18 ENUMERATED {even0, odd1} OPTIONAL, --Need R

txHoppingConfig-r18 TxHoppingConfig-r18 OPTIONAL --Need R

]]

}

SRS-SpatialRelationInfo ::= SEQUENCE {

servingCellId ServCellIndex OPTIONAL, -- Need S

referenceSignal CHOICE {

ssb-Index SSB-Index,

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

srs SEQUENCE {

resourceId SRS-ResourceId,

uplinkBWP BWP-Id

}

}

}

SRS-SpatialRelationInfoPos-r16 ::= CHOICE {

servingRS-r16 SEQUENCE {

servingCellId 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

}

}

},

ssb-Ncell-r16 SSB-InfoNcell-r16,

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

}

SSB-Configuration-r16 ::= SEQUENCE {

ssb-Freq-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

sfn0-Offset-r16 SEQUENCE {

sfn-Offset-r16 INTEGER (0..1023),

integerSubframeOffset-r16 INTEGER (0..9) OPTIONAL -- Need R

} OPTIONAL, -- Need R

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 OPTIONAL, -- Need S

ssb-Configuration-r16 SSB-Configuration-r16 OPTIONAL -- Need S

}

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

dl-PRS-ID-r16 INTEGER (0..255),

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

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

}

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),

...

}

SRS-PeriodicityAndOffsetExt-r16 ::= CHOICE {

sl128 INTEGER(0..127),

sl256 INTEGER(0..255),

sl512 INTEGER(0..511),

sl20480 INTEGER(0..20479)

}

SpatialRelationInfo-PDC-r17 ::= SEQUENCE {

referenceSignal CHOICE {

ssb-Index SSB-Index,

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

dl-PRS-PDC NR-DL-PRS-ResourceID-r17,

srs SEQUENCE {

resourceId SRS-ResourceId,

uplinkBWP BWP-Id

},

...

},

...

}

TxHoppingConfig-r18 ::= SEQUENCE {

overlapValue-r18 ENUMERATED {zeroRB, oneRB, twoRB, fourRB},

numberOfHops-r18 INTEGER(2..6),

slotOffsetForRemainingHopsList-r18 SEQUENCE (SIZE (1..maxNrofHops-r18-1) ) OF SlotOffsetForRemainingHops-r18,

...

}

SlotOffsetForRemainingHops-r18 ::= SEQUENCE {

slotOffsetRemainingHops-r18 CHOICE {

aperiodic-r18 SEQUENCE {

slotOffset-r18 INTEGER (1..32) OPTIONAL, -- Need S

startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need R

...

},

semi-persistent-r18 SEQUENCE {

periodicityAndOffset-sp-r18 SRS-PeriodicityAndOffset-r16 OPTIONAL, -- Need R

periodicityAndOffset-sp-Ext-r18 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL, -- Need R

startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need R

...

},

periodic-r18 SEQUENCE {

periodicityAndOffset-p-r18 SRS-PeriodicityAndOffset-r16 OPTIONAL, -- Need R

periodicityAndOffset-p-Ext-r18 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL, -- Need R

startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need S

...

},

...

}

}

-- TAG-SRS-CONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***SRS-Config* field descriptions** |
| ***dci-TriggeringPosResourceSetLink***  Indicates whether the single DCI-triggering SRS positioning resource sets across the linked carriers is enabled or not for bandwidth aggregation. |
| ***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, SRS-PosResource* 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). |
| ***cyclicShift-n8***  Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1). |
| ***combOffsetHopping***  Configures UE with comb offset hopping. The *hoppingId* is used to initialize pseudo random comb offset hopping. If UE is configured with both comb offset and cyclic shift hopping, only one *hoppingId* is configured. The *hoppingWithRepetition* configures time-domain hopping behavior for repetition factor R>1. The *hoppingSubset* indicates a set of comb offset by a bit string (see clause 6.4.1.4.3 of TS 38.211 [16]). The *i*-th bit in the bit string is set to 1 to indicate the , where *t* is determined by its ordinary position among the positive bits in bit string, i.e., if the *i*-th bit is a first positive bit, *t=0*; if the *i*-th bit is a second positive bit, *t=1* , and so on. |
| ***cyclicShiftHopping***  Configures UE with cyclic shift hopping. The *hoppingId* is used to initialize pseudo random cyclic shift hopping. If UE is configured with both comb offset and cyclic shift hopping, only one *hoppingId* is configured. The *hoppingFinerGranularity* enables finer granular hopping, see TS 38.211 [16], clause 6.4.1.4.2. If *hoppingSubset* is configured, *hoppingFinerGranularity* is not configured. The hoppingSubset indicates a set of cyclic shift by a bit string (see clause 6.4.1.4.2 of TS 38.211 [16]). The *i*-th bit in the bit string is set to 1 to indicate the , where *t* is determined by its ordinary position among the positive bits in bit string, i.e., if the *i*-th bit is a first positive bit, *t=0*; if the *i*-th bit is a second positive bit, *t=1* , and so on. |
| ***enableStartRBHopping***  When this RRC parameter is configured, start RB location hopping is enabled for partial frequency sounding in different SRS frequency hopping periods for periodic/semi-persistent/aperiodic SRS as described in clause 6.4.1.4 in TS 38.211. |
| ***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*. For SRS for positioning configuration in multiple cells this field is commonly configured across cells within the validity area. *c-SRS* Indicates the maximum bandwidth. When *TxHoppingConfig* is configured thevalid values for *c-SRS* are such that the maximum bandwidthis: 104 PRBs, 48 PRBs, 132 PRBs, 64 PRBs, for 15,30,60,120 KHz respectively. The same value for *c-SRS* is configured for all the hops when TxHoppingConfig is configured. |
| ***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'. For SRS for positioning configuration in multiple cells this field is commonly configured across cells within the validity area. |
| ***nrofSRS-Ports***  Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'. |
| ***nrofSRS-Ports-n8***  Number of ports if the number of antenna ports is 8. The value 'ports8' configures UE with 8 antenna ports and the value 'ports8tdm' configures the UE with 8 antenna ports which are partitioned into 2 subsets with each subset having 4 different ports, and the subsets are mapped to different OFDM symbols, see TS 38.211 [16], clause 6.4.1.4.2. If *combOffsetHopping-r18* or *cyclicShiftHopping-r18* is configured, this field is not set to *ports8tdm*. If this field is present UE ignores the field *nrofSRS-Ports*. |
| ***periodicityAndOffset-p, periodicityAndOffset-p-Ext***  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. For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz except when periodicity of 20480ms is configured.  When *periodicityAndOffset-p-Ext* is present, *periodicityAndOffset-p* shall be ignored by the UE. |
| ***periodicityAndOffset-sp, periodicityAndOffset-sp-Ext***  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 *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz.  When *periodicityAndOffset-sp-Ext* is present, *periodicityAndOffset-sp* shall be ignored by the UE. |
| ***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). If *resourceMapping-r17* is signalled, *resourceMapping-r16* is not signalled and the UE shall ignore the *resourceMapping* (without suffix) and only the values of nrofSymbols which are integer multiples of the configured repetitionFactor can be configured. The network can only signal *repetitionFactor-v1730* if *resourceMapping-r17* is signalled. When *repetitionFactor-v1730* is signalled, the UE shall ignore *repetitionFactor-r17*. For CLI SRS-RSRP measurement, the network always configures *nrofSymbols* and *repetitionFactor* to 'n1'. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. *nrofSymbols* is same for all the hops when *TxHoppingConfig* is configured. |
| ***resourceType***  Periodicity and offset for semi-persistent and periodic SRS resource, or slot offset for aperiodic SRS resource for positioning (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, only 'periodic' is applicable for *resourceType*. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. |
| ***slotOffset***  An offset in number of slots between the triggering DCI and the actual transmission of this *SRS-PosResource*. If the field is absent the UE applies no offset (value 0). |
| ***sequenceId***  Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1). If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. |
| ***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. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell. |
| ***spatialRelationInfo-PDC***  Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS-PDC (see TS 38.214 [19], clause 6.2.1). The field is present in case of *resourceType=periodic* and *usagePDC-r17=true* in the *SRS-ResourceSet*, otherwise the field is absent. |
| ***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).  If the IE *srs-ResourceId-Ext* is present, the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 63. Otherwise the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 31. |
| ***srs-PosPeriodicConfigHyperSFN-Index***  Indicates whether the current Hyper SFN is even or odd HSFN for SRS for Positioning transmission. If this field is not configured, the UE assumes that SRS for positioning periodictity longer than one Hyper SFN is not configured. |
| ***srs-RequestDCI-0-2***  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-RequestDCI-0-2* 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-RequestDCI-1-2***  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-ResourceSetToAddModListDCI-0-2***  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-ResourceSetToReleaseListDCI-0-2***  List of SRS resource set to be released for DCI format 0\_2 (see TS 38.212 [17], clause 7.3.1). |
| ***srs-TCI-State***  Configuration of either a UL TCI state or a joint TCI state for the SRS resource. In case of *UL TCI-State*, refers to the TCI state defined in *ul-TCI-StateList* in the *BWP-UplinkDedicated* where the *SRS-Config* is configured. In case of joint TCI state, refers to a TCI state defined in *dl-OrJointTCI-StateList* in *pdsch-Config* of the *BWP-DownlinkDedicated* and serving cell indicated by *cellAndBWP*.This field is absent when the SRS resource is in an *SRS-ResourceSet* configured with *followUnifiedTCI-StateSRS-r17 or applyIndicatedTCI-State,* or when the field *unifiedTCI-StateType* is not configured to the serving cell which the SRS resource is located in. |
| ***startRBIndexAndFreqScalingFactor***  Configures the UE with the startRBIndex and freqScalingFactor for partial frequency sounding as described in Clause 6.4.1.4 in TS 38.211. The startRBIndexForFScaling2 gives the startRBIndex when freqScalingFactor is 2 and the startRBIndexForFScaling4 gives the startRBIndex when FreqScalingFactor is 4 |
| ***transmissionComb, transmissionComb-n2, transmissionComb-n4, transmissionComb-n8***  Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1). If network configures field *transmissionComb-n8*, the UE ignores *transmissionComb.* If *srs-PosRRC-InactiveValidityAreaPreConfig* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. |

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| ***SRS-ResourceSet, SRS-PosResourceSet* 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. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. |
| ***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). 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). |
| ***applyIndicatedTCI-State***  This field indicates, for an SRS-ResourceSet, if UE applies the first or the second "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.2.1. If more than one value for the field *coresetPoolIndex* is configured in IE *controlResourceSet* for the BWP, the value 'first' corresponds to the "indicated" joint/UL TCI states specific to *coresetPoolIndex* value 0 and the value 'second' correspond to the value 1, respectively. When UE is configured with two SRS resource sets with *usage* set to *Codebook* or *nonCodebook,* network does not configure the first set with value 'second' or second set with value 'first'. |
| ***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). |
| ***availableSlotOffsetList***  Indicates a list of up to four different available slot offset values from slot n+k to the slot where the aperiodic SRS resource set is transmitted, where slot n is the slot with the triggering DCI, and k is the *slotOffset* (without suffix) as described in clause 6.2.1 of TS 38.214 [19]. |
| ***csi-RS***  ID of CSI-RS resource associated with this SRS resource set (see TS 38.214 [19], clause 6.1.1.2). |
| ***dl-PRS***  This field indicates a PRS configuration. |
| ***followUnifiedTCI-StateSRS***  When set to enabled, for SRS resource Set, the UE applies the "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. This parameter may be configured for aperiodic SRS for BM or SRS of any time-domain behavior for codebook, non-codebook, and antenna switching. |
| ***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). If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. |
| ***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). |
| ***pathlossReferenceRS-Pos***  A reference signal (e.g. a SS block or a DL-PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3). |
| ***pathlossReferenceRSList***  Multiple candidate pathloss reference RS(s) for SRS power control, where one candidate RS can be mapped to SRS Resource Set via MAC CE (clause 6.1.3.27 in TS 38.321 [3]). The network can only configure this field if *pathlossReferenceRS* is not configured in the same *SRS-ResourceSet*. |
| ***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. The aperiodic SRS is not applicable for the UE in RRC\_INACTIVE. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area. |
| ***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, srs-PosResourceIdList***  The IDs of the SRS-Resources/SRS-PosResource used in this *SRS-ResourceSet/SRS-PosResourceSet*. 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. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, *srs-PosResourceIdList* is commonly configured across cells within the validity area. |
| ***srs-ResourceSetId, srs-PosResourceSetId***  The ID of this resource set. It is unique in the context of the BWP in which the parent *SRS-Config* is defined. If *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, *srs-PosResourceSetId* is commonly configured across cells within the validity area. |
| ***ssb-IndexServing***  Indicates SSB index belonging to a serving cell where the SRS is configured. |
| ***ssb-Ncell***  This field indicates a SSB configuration from neighboring cell. |
| ***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. |
| ***usagePDC***  If configured, it indicates that this SRS resource set is used for propagation delay compensation. The field can be present in only one *SRS-ResourceSet*. |

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| ***SRS-SpatialRelationInfoPos* field descriptions** |
| ***csi-RS-IndexServing***  Indicates CSI-RS index belonging to a serving cell. |
| ***dl-PRS***  This field indicates a PRS configuration. |
| ***resourceSelection***  Indicates whether the configured SRS spatial relation resource is a *SRS-Resource* or *SRS-PosResource*. |
| ***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 the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured. |
| ***ssb-IndexServing***  Indicates SSB index belonging to a serving cell. |
| ***ssb-Ncell***  This field indicates a SSB configuration from neighboring cell. |

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| ***SSB-InfoNCell* field descriptions** |
| ***physicalCellId***  This field specifies the physical cell ID of the neighbour cell or NCD-SSB of the serving cell for which SSB configuration is provided. |
| ***ssb-IndexNcell***  This field specifies the index of the SSB for a neighbour cell or NCD-SSB of the serving cell. See TS 38.213 [13]. If this field is absent, the UE determines the *ssb-IndexNcell* of the *physicalCellId*  based on its SSB measurement from the cell. |
| ***ssb-Configuration***  This field specifies the full configuration of the SSB. If this field is absent, the UE obtains the configuration for the SSB from *nr-SSB-Config* received as part of DL-PRS assistance data in LPP*,* see TS 37.355 [49], by looking up the corresponding SSB configuration using the field *physicalCellId*. |

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| ***DL-PRS-Info* field descriptions** |
| ***dl-PRS-ID***  This field specifies the UE specific TRP ID (see TS 37.355 [49]) for which PRS configuration is provided. |
| ***dl-PRS-ResourceSetId***  This field specifies the PRS-ResourceSet ID of a PRS resourceSet. |
| ***dl-PRS-ResourceId***  This field specifies the PRS-Resource ID of a PRS resource. If this field is absent, the UE determines the *dl-PRS-ResourceID* based on its PRS measurement from the TRP (see TS 37.355 [49]) and DL-PRS Resource Set. |

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| ***SSB-Configuration* field descriptions** |
| ***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. |
| ***integerSubframeOffset***  Indicates the subframe boundary offset of the cell in which SSB is transmited. |
| ***sfn0-Offset***  Indiactes the time offset of the SFN0 slot 0 for the cell with respect to SFN0 slot 0 of serving cell. |
| ***sfn-Offset***  Specifies the SFN offset between the cell in which SSB is transmited and serving cell. The offset corresponds to the number of full radio frames counted from the beginning of a radio frame #0 of serving cell to the beginning of the closest subsequent radio frame #0 of the cell in which SSB is transmitted. |
| ***sfn-SSB-Offset***  Indicates the SFN offset of the transmitted SSB relative to the start of the SSB period. Value 0 indicates that the SSB is transmitted in the first system frame, value 1 indicates that SSB is transmitted in the second system frame and so on. The network configures this field according to the field *ssb-Periodicity* such that the indicated system frame does not exceed the configured SSB periodicity. |
| ***ssb-Freq***  Indicates the frequency of the SSB. |
| ***ss-PBCH-BlockPower***  Average EPRE of the resources elements that carry secondary synchronization signals in dBm that the NW used for SSB transmission, see TS 38.213 [13], clause 7. |
| ***ssb-Periodicity***  Indicates the periodicity of the SSB. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1) |
| ***ssbSubcarrierSpacing***  Subcarrier spacing of SSB.  Only the following values are applicable depending on the used frequency:  FR1: 15 or 30 kHz  FR2-1: 120 or 240 kHz  FR2-2: 120, 480, or 960 kHz |

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| ***TxHoppingConfig* field descriptions** |
| ***numberOfHops***  This field specifies the number of hops. The configured values are 2,3,4,5,6. |
| ***overlapValue***  This field specifies the overlap during SRS transmission in terms of number of *resource blocks*. Value *zeroRB* implies *0 RB*, value *oneRB* corresponds to *1 RB*, value *twoRB* corresponds to *2 RBs* and so on. The same value for the *overlapValue* is configured to all the hops. |
| ***slotOffsetForRemainingHopsList***  This field specifies the starting slot offset and starting symbol for the SRS resource with tx hopping for different resource types (aperiodic, semi-persistent or periodic SRS transmission). Each hop is configured with the same periodcity. |

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| **Conditional Presence** | **Explanation** |
| *DLorJointTCI-SRS* | The field is mandatory present if srs-DLorJointTCI-State is configured, otherwise it is absent Need R. |
| *FollowUTCI* | The field is absent if the field *followUnifiedTCI-State* is present. Otherwise, it is optionally present, Need R. |
| *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 |
| *Setup* | This field is mandatory present upon configuration of SRS-ResourceSet or SRS-Resource and optionally present, Need M, otherwise. |

=================================================== CHANGE ENDS ===================================================