**3GPP TSG-RAN WG2 Meeting #121 R2-2301982**

**Athens, Greece, 27th February – 3rd March, 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.331** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **17.3.0** |  |
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| *For* [***HELP***](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:***  | Corrections on satellite ephemeris indication |
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| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_NTN\_solutions |  | ***Date:*** | 2023-03-03 |
|  |  |  |  |  |
| ***Category:*** |  **F**  |  | ***Release:*** | Rel-17 |
|  | *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 canbe 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | RAN4 informed RAN2 that UE may ignore measurements if network does not provide ephemeris information for the cell. Current SIB19 can provide neighbor satellite ephemeris via two lists, both of size 4. This assumes that the PCIs in the list are from neighbouring satellites. If this list is used to inform about neighbor cells provided by same satellite, the ntn-Config-r17 is repeated 4 times in addition to the ntn-Config-r17 in the SIB19 for the serving satellite. This increases the SIB size which may be issue in some scenarios.For connected mode UEs configured with measurements, it is not clear whether cells found on carrier pointed out by MO would belong to serving satellite or a neighbor satellite for which ntn-Config-r17 is provided in SIB19 if the PCI is not pointed out in SIB19.  |
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| ***Summary of change:*** | 1. Add in the field description of SIB19 “If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigList*, the *ntn-Config* provided in the previous entry in *ntn-NeighCellConfigList* applies. Network provides *ntn-Config* for the first entry of *ntn-NeighCellConfigList*.”
2. Add a field description of servingCellMO “For NTN deployments, UE may assume the PCIs in *cellsToAddModList, allowedCellsToAddModList* or *excludedCellsToAddModList* configured in this *MeasObjectNR* to belong to the serving satellite.”

**Impact Analysis**Impacted 5G architecture options: NR SA Impacted functionality: NTN neighbor cell measurementsInter-operability:1. If the network is implemented according to the CR and the UE is not, UE may not measure a PCI in case it does not know the ntn-Config-r17 provided linking to that PCI.2. If the UE is implemented according to the CR and the network is not, there is no inter-operability issue. |
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| ***Consequences if not approved:*** | UE may not measure a PCI in case it does not know the ntn-Config-r17 provided linking to that PCI |
|  |  |
| ***Clauses affected:*** |  6.3.1, 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 ...  |
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| ***Other comments:*** | First change is functionally NBC, second change is NBC. |
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| ***This CR's revision history:*** |  |

*START OF CHANGE*

### 6.3.1 System information blocks

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– *SIB19*

*SIB19* contains satellite assistance information for NTN access.

***SIB19* information element**

-- ASN1START

-- TAG-SIB19-START

SIB19-r17 ::= SEQUENCE {

 ntn-Config-r17 NTN-Config-r17 OPTIONAL, -- Need R

 t-Service-r17 INTEGER (0..549755813887) OPTIONAL, -- Need R

 referenceLocation-r17 ReferenceLocation-r17 OPTIONAL, -- Need R

 distanceThresh-r17 INTEGER(0..65525) OPTIONAL, -- Need R

 ntn-NeighCellConfigList-r17 NTN-NeighCellConfigList-r17 OPTIONAL, -- Need R

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[

 ntn-NeighCellConfigListExt-v1720 NTN-NeighCellConfigList-r17 OPTIONAL -- Need R

 ]]

}

NTN-NeighCellConfigList-r17 ::= SEQUENCE (SIZE(1..maxCellNTN-r17)) OF NTN-NeighCellConfig-r17

NTN-NeighCellConfig-r17 ::= SEQUENCE {

 ntn-Config-r17 NTN-Config-r17 OPTIONAL, -- Need R

 carrierFreq-r17 ARFCN-ValueNR OPTIONAL, -- Need R

 physCellId-r17 PhysCellId OPTIONAL -- Need R

}

-- TAG-SIB19-STOP

-- ASN1STOP

| ***SIB19* field descriptions** |
| --- |
| ***distanceThresh***Distance from the serving cell reference location and is used in location-based measurement initiation in RRC\_IDLE and RRC\_INACTIVE, as defined in TS 38.304 [20]. Each step represents 50m. |
| ***ntn-Config***Provides parameters needed for the UE to access NR via NTN access such as Ephemeris data, common TA parameters, k\_offset, validity duration for UL sync information and epoch. |
| ***ntn-NeighCellConfigList, ntn-NeighCellConfigListExt***Provides a list of NTN neighbour cells including their *ntn-Config*, carrier frequency and *PhysCellId*. This set includes all elements of *ntn-NeighCellConfigList* and all elements of *ntn-NeighCellConfigListExt*. If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigListExt*, the *ntn-Config* provided in the entry at the same position in *ntn-NeighCellConfigList* applies. Network provides *ntn-Config* for the first entry of *ntn-NeighCellConfigList.* If the *ntn-Config* is absent for an other entry in *ntn-NeighCellConfigList*, the *ntn-Config* provided in the previous entry in *ntn-NeighCellConfigList* applies.  |
| ***referenceLocation***Reference location of the serving cell provided via NTN quasi-Earth fixed system and is used in location-based measurement initiation in RRC\_IDLE and RRC\_INACTIVE, as defined in TS 38.304 [20]. |
| ***t-Service***Indicates the time information on when a cell provided via NTN quasi-Earth fixed system is going to stop serving the area it is currently covering. The field indicates a time in multiples of 10 ms after 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). The exact stop time is between the time indicated by the value of this field minus 1 and the time indicated by the value of this field. |

*NEXT CHANGE*

### 6.3.2 Radio resource control information elements

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#### *– MeasObjectNR*

The IE *MeasObjectNR* specifies information applicable for SS/PBCH block(s) intra/inter-frequency measurements and/or CSI-RS intra/inter-frequency measurements.

*MeasObjectNR* information element

-- ASN1START

-- TAG-MEASOBJECTNR-START

MeasObjectNR ::= SEQUENCE {

 ssbFrequency ARFCN-ValueNR OPTIONAL, -- Cond SSBorAssociatedSSB

 ssbSubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond SSBorAssociatedSSB

 smtc1 SSB-MTC OPTIONAL, -- Cond SSBorAssociatedSSB

 smtc2 SSB-MTC2 OPTIONAL, -- Cond IntraFreqConnected

 refFreqCSI-RS ARFCN-ValueNR OPTIONAL, -- Cond CSI-RS

 referenceSignalConfig ReferenceSignalConfig,

 absThreshSS-BlocksConsolidation ThresholdNR OPTIONAL, -- Need R

 absThreshCSI-RS-Consolidation ThresholdNR OPTIONAL, -- Need R

 nrofSS-BlocksToAverage INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need R

 nrofCSI-RS-ResourcesToAverage INTEGER (2..maxNrofCSI-RS-ResourcesToAverage) OPTIONAL, -- Need R

 quantityConfigIndex INTEGER (1..maxNrofQuantityConfig),

 offsetMO Q-OffsetRangeList,

 cellsToRemoveList PCI-List OPTIONAL, -- Need N

 cellsToAddModList CellsToAddModList OPTIONAL, -- Need N

 excludedCellsToRemoveList PCI-RangeIndexList OPTIONAL, -- Need N

 excludedCellsToAddModList SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement OPTIONAL, -- Need N

 allowedCellsToRemoveList PCI-RangeIndexList OPTIONAL, -- Need N

 allowedCellsToAddModList SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement OPTIONAL, -- Need N

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 freqBandIndicatorNR FreqBandIndicatorNR OPTIONAL, -- Need R

 measCycleSCell ENUMERATED {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280} OPTIONAL -- Need R

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 smtc3list-r16 SSB-MTC3List-r16 OPTIONAL, -- Need R

 rmtc-Config-r16 SetupRelease {RMTC-Config-r16} OPTIONAL, -- Need M

 t312-r16 SetupRelease { T312-r16 } OPTIONAL -- Need M

 ]],

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 associatedMeasGapSSB-r17 MeasGapId-r17 OPTIONAL, -- Need R

 associatedMeasGapCSIRS-r17 MeasGapId-r17 OPTIONAL, -- Need R

 smtc4list-r17 SSB-MTC4List-r17 OPTIONAL, -- Need R

 measCyclePSCell-r17 ENUMERATED {ms160, ms256, ms320, ms512, ms640, ms1024, ms1280, spare1}

 OPTIONAL, -- Cond SCG

 cellsToAddModListExt-v1710 CellsToAddModListExt-v1710 OPTIONAL -- Need N

 ]],

 [[

 associatedMeasGapSSB2-v1720 MeasGapId-r17 OPTIONAL, -- Cond AssociatedGapSSB

 associatedMeasGapCSIRS2-v1720 MeasGapId-r17 OPTIONAL -- Cond AssociatedGapCSIRS

 ]],

 [[

 cellsToAddModListExt-v17xy CellsToAddModListExt-v17xy OPTIONAL -- Need N

 ]]

}

SSB-MTC3List-r16::= SEQUENCE (SIZE(1..4)) OF SSB-MTC3-r16

SSB-MTC4List-r17::= SEQUENCE (SIZE(1..3)) OF SSB-MTC4-r17

T312-r16 ::= ENUMERATED { ms0, ms50, ms100, ms200, ms300, ms400, ms500, ms1000}

ReferenceSignalConfig::= SEQUENCE {

 ssb-ConfigMobility SSB-ConfigMobility OPTIONAL, -- Need M

 csi-rs-ResourceConfigMobility SetupRelease { CSI-RS-ResourceConfigMobility } OPTIONAL -- Need M

}

SSB-ConfigMobility::= SEQUENCE {

 ssb-ToMeasure SetupRelease { SSB-ToMeasure } OPTIONAL, -- Need M

 deriveSSB-IndexFromCell BOOLEAN,

 ss-RSSI-Measurement SS-RSSI-Measurement OPTIONAL, -- Need M

 ...,

 [[

 ssb-PositionQCL-Common-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

 ssb-PositionQCL-CellsToAddModList-r16 SSB-PositionQCL-CellsToAddModList-r16 OPTIONAL, -- Need N

 ssb-PositionQCL-CellsToRemoveList-r16 PCI-List OPTIONAL -- Need N

 ]],

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 deriveSSB-IndexFromCellInter-r17 ServCellIndex OPTIONAL, -- Need R

 ssb-PositionQCL-Common-r17 SSB-PositionQCL-Relation-r17 OPTIONAL, -- Cond SharedSpectrum2

 ssb-PositionQCL-Cells-r17 SetupRelease {SSB-PositionQCL-CellList-r17} OPTIONAL -- Need M

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 cca-CellsToAddModList-r17 PCI-List OPTIONAL, -- Need N

 cca-CellsToRemoveList-r17 PCI-List OPTIONAL -- Need N

 ]]

}

Q-OffsetRangeList ::= SEQUENCE {

 rsrpOffsetSSB Q-OffsetRange DEFAULT dB0,

 rsrqOffsetSSB Q-OffsetRange DEFAULT dB0,

 sinrOffsetSSB Q-OffsetRange DEFAULT dB0,

 rsrpOffsetCSI-RS Q-OffsetRange DEFAULT dB0,

 rsrqOffsetCSI-RS Q-OffsetRange DEFAULT dB0,

 sinrOffsetCSI-RS Q-OffsetRange DEFAULT dB0

}

ThresholdNR ::= SEQUENCE{

 thresholdRSRP RSRP-Range OPTIONAL, -- Need R

 thresholdRSRQ RSRQ-Range OPTIONAL, -- Need R

 thresholdSINR SINR-Range OPTIONAL -- Need R

}

CellsToAddModList ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddMod

CellsToAddModListExt-v1710 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddModExt-v1710

CellsToAddMod ::= SEQUENCE {

 physCellId PhysCellId,

 cellIndividualOffset Q-OffsetRangeList

}

CellsToAddModExt-v1710 ::= SEQUENCE {

 ntn-PolarizationDL-r17 ENUMERATED {rhcp,lhcp,linear} OPTIONAL, -- Need R

 ntn-PolarizationUL-r17 ENUMERATED {rhcp,lhcp,linear} OPTIONAL -- Need R

}

CellsToAddModExt-v17xx ::= SEQUENCE {

 satelliteInfoId-r17 INTEGER(0..8) OPTIONAL -- Need R

}

RMTC-Config-r16 ::= SEQUENCE {

 rmtc-Periodicity-r16 ENUMERATED {ms40, ms80, ms160, ms320, ms640},

 rmtc-SubframeOffset-r16 INTEGER(0..639) OPTIONAL, -- Need M

 measDurationSymbols-r16 ENUMERATED {sym1, sym14or12, sym28or24, sym42or36, sym70or60},

 rmtc-Frequency-r16 ARFCN-ValueNR,

 ref-SCS-CP-r16 ENUMERATED {kHz15, kHz30, kHz60-NCP, kHz60-ECP},

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 rmtc-Bandwidth-r17 ENUMERATED {mhz100, mhz400, mhz800, mhz1600, mhz2000} OPTIONAL, -- Need R

 measDurationSymbols-v1700 ENUMERATED {sym140, sym560, sym1120} OPTIONAL, -- Need R

 ref-SCS-CP-v1700 ENUMERATED {kHz120, kHz480, kHz960} OPTIONAL, -- Need R

 tci-StateInfo-r17 SEQUENCE {

 tci-StateId-r17 TCI-StateId,

 ref-ServCellId-r17 ServCellIndex OPTIONAL -- Need R

 } OPTIONAL -- Need R

 ]],

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 ref-BWPId-r17 BWP-Id OPTIONAL -- Need R

 ]]

}

SSB-PositionQCL-CellsToAddModList-r16 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-CellsToAddMod-r16

SSB-PositionQCL-CellsToAddMod-r16 ::= SEQUENCE {

 physCellId-r16 PhysCellId,

 ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16

}

SSB-PositionQCL-CellList-r17 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-Cell-r17

SSB-PositionQCL-Cell-r17 ::= SEQUENCE {

 physCellId-r17 PhysCellId,

 ssb-PositionQCL-r17 SSB-PositionQCL-Relation-r17

}

-- TAG-MEASOBJECTNR-STOP

-- ASN1STOP

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| *CellsToAddMod* field descriptions |
| ***cellIndividualOffset***Cell individual offsets applicable to a specific cell. |
| ***physCellId***Physical cell identity of a cell in the cell list. |
| ***ntn-PolarizationDL***If present, this parameter indicates polarization information for downlink transmission on service link: including Right hand, Left hand circular polarizations (RHCP, LHCP) and Linear polarization. |
| ***ntn-PolarizationUL***If present, this parameter indicates polarization information for uplink transmission on service link. If not present and *ntn-PolarizationDL* is present, UE assumes the same polarization for UL and DL. |
| ***satelliteInfoId*** The satellite identity in SIB19 for the *physCellId* in *CellsToAddMod*. The value 0 indicates the serving satellite. The value 1 indicates the first entry in *ntn-NeighCellConfigList* in SIB19 and so on. The value 5 indicates the first entry in *ntn-NeighCellConfigListExt* in SIB19 and so on. |

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| *MeasObjectNR* field descriptions |
| ***absThreshCSI-RS-Consolidation***Absolute threshold for the consolidation of measurement results per CSI-RS resource(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per CSI-RS resource as described in 5.5.5.2. |
| ***absThreshSS-BlocksConsolidation***Absolute threshold for the consolidation of measurement results per SS/PBCH block(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per SS/PBCH block index as described in 5.5.5.2. |
| ***allowedCellsToAddModList***List of cells to add/modify in the allow-list of cells. It applies only to SSB resources. |
| ***allowedCellsToRemoveList***List of cells to remove from the allow-list of cells. |
| ***associatedMeasGapSSB***Indicates the associated measurement gap for SSB measuring identified by *ssb-ConfigMobility* in this measurement object. When multiple *MeasObjectNR* with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each *MeasObjectNR*. If this field is absent, the associated measurement gap is the gap configured via *gapFR1*, *gapFR2*, or *gapUE*. |
| ***associatedMeasGapSSB2***Indicates the associated additional measurement gap for SSB measuring identified by *ssb-ConfigMobility* in this measurement object for NTN deployments. When multiple *MeasObjectNR* with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each *MeasObjectNR*. If this field is absent, the associated measurement gap is the gap indicated by *associatedMeasGapSSB*. |
| ***associatedMeasGapCSIRS***Indicates the associated measurement gap for CSI-RS measuring identified by *csi-rs-ResourceConfigMobility* in this measurement object. If this field is absent, the associated measurement gap is the gap configured via *gapFR1*, *gapFR2*, or *gapUE*. |
| ***associatedMeasGapCSIRS*2**Indicates the associated additional measurement gap for CSI-RS measuring identified by *csi-rs-ResourceConfigMobility* in this measurement object for NTN deployments. If this field is absent, the associated measurement gap is the gap indicated by *associatedMeasGapCSIRS.* In this release of the specification, this field is not configured for NTN deployments. |
| ***cellsToAddModList***List of cells to add/modify in the cell list. |
| ***cellsToRemoveList***List of cells to remove from the cell list.  |
| ***excludedCellsToAddModList***List of cells to add/modify in the exclude-list of cells. It applies only to SSB resources. |
| ***excludedCellsToRemoveList***List of cells to remove from the exclude-list of cells. |
| ***freqBandIndicatorNR***The frequency band in which the SSB and/or CSI-RS indicated in this *MeasObjectNR* are located and according to which the UE shall perform the RRM measurements. This field is always provided when the network configures measurements with this *MeasObjectNR*. |
| ***measCyclePSCell***The parameter is used only when the PSCell is configured on the frequency indicated by the *measObjectNR* and the SCG is deactivated, see TS 38.133 [14]. The field may also be configured when the PSCell is not configured on that frequency. Value ms*160* corresponds to 160 ms, value *ms256* corresponds to 256 ms and so on. |
| ***measCycleSCell***The parameter is used only when an SCell is configured on the frequency indicated by the measObjectNR and is in deactivated state, see TS 38.133 [14]. gNB configures the parameter whenever an SCell is configured on the frequency indicated by the *measObjectNR*, but the field may also be signalled when an SCell is not configured. Value *sf160* corresponds to 160 sub-frames, value *sf256* corresponds to 256 sub-frames and so on. |
| ***nrofCSInrofCSI-RS-ResourcesToAverage***Indicates the maximum number of measurement results per beam based on CSI-RS resources to be averaged. The same value applies for each detected cell associated with this *MeasObjectNR*. |
| ***nrofSS-BlocksToAverage***Indicates the maximum number of measurement results per beam based on SS/PBCH blocks to be averaged. The same value applies for each detected cell associated with this *MeasObject*. |
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|  |
| ***offsetMO***Offset values applicable to all measured cells with reference signal(s) indicated in this *MeasObjectNR*. |
| ***quantityConfigIndex***Indicates the n-*th* element of *quantityConfigNR-List* provided in *MeasConfig*. |
| ***referenceSignalConfig***RS configuration for SS/PBCH block and CSI-RS. |
| ***refFreqCSI-RS***Point A which is used for mapping of CSI-RS to physical resources according to TS 38.211 [16] clause 7.4.1.5.3. |
| ***smtc1***Primary measurement timing configuration. (see clause 5.5.2.10). |
| ***smtc2***Secondary measurement timing configuration for SS corresponding to this *MeasObjectNR* with PCI listed in *pci-List*. For these SS, the periodicity is indicated by *periodicity* in *smtc2* and the timing offset is equal to the offset indicated in *periodicityAndOffset* modulo *periodicity*. *periodicity* in smtc2 can only be set to a value strictly shorter than the periodicity indicated by *periodicityAndOffset* in *smtc1* (e.g. if *periodicityAndOffset* indicates *sf10*, *periodicity* can only be set of *sf5*, if *periodicityAndOffset* indicates *sf5*, *smtc2* cannot be configured). |
| ***smtc3list***Measurement timing configuration list for SS corresponding to IAB-MT. This is used for the IAB-node's discovery of other IAB-nodes and the IAB-Donor-DUs. |
| ***smtc4list***Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. |
| ***ssbFrequency***Indicates the frequency of the SS associated to this *MeasObjectNR*. For operation with shared spectrum channel access, this field is a k\*30 kHz shift from the sync raster where k = 0,1,2, and so on if the *reportType* within the corresponding *ReportConfigNR* is set to reportCGI (see TS 38.211 [16], clause 7.4.3.1). Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15]). |
| ***ssb-PositionQCL-Common***Indicates the QCL relationship between SS/PBCH blocks for all measured cells as specified in 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 kHzFR2-1: 120 or 240 kHzFR2-2: 120, 480, or 960 kHz |
| ***t312***The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on. |

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| *ReferenceSignalConfig* field descriptions |
| ***csi-rs-ResourceConfigMobility***CSI-RS resources to be used for CSI-RS based RRM measurements. |
| ***ssb-ConfigMobility***SSB configuration for mobility (nominal SSBs, timing configuration). |

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| *RMTC-Config* field descriptions |
| ***measDurationSymbols***Number of consecutive symbols for which the Physical Layer reports samples of RSSI (see TS 38.215 [9], clause 5.1.21). Value *sym1* corresponds to one symbol, *sym14or12* corresponds to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, and so on.If *measDurationSymbols-v1700* is signalled, the UE ignores *measDurationSymbols-r16*. |
| ***ref-BWPId***Indicates the reference BWP for the TCI state indicated in *tci-StateInfo.* Network includes this field if *tci-StateInfo* is present. This field is only applicable for operation with shared spectrum channel access in FR2-2 and network does not configure this if the UE does not have any serving cells in FR2-2. |
| ***ref-SCS-CP***Indicates a reference subcarrier spacing and cyclic prefix to be used for RSSI measurements (see TS 38.215 [9]). Value kHz15 corresponds to 15kHz, kHz30 corresponds to 30 kHz, value kHz60-NCP corresponds to 60 kHz using normal cyclic prefix (NCP), and kHz60-ECP corresponds to 60 kHz using extended cyclic prefix (ECP).If *ref-SCS-CP-v1700* is signalled, the UE ignores *ref-SCS-CP-r16*. |
| ***ref-ServCellId***Indicates the FR2-2 reference serving cell index for the TCI state. Network includes this field if *tci-StateInfo* is present. This field is only applicable for operation with shared spectrum channel access in FR2-2 and network does not configure this if the UE does not have any serving cells in FR2-2. |
| ***rmtc-Bandwidth***Indicates the bandwidth for the RSSI measurement (see TS 38. 215 [9], clause 5.1.21). |
| ***rmtc-Frequency***Indicates the center frequency of the measured bandwidth for a frequency which operates with shared spectrum channel access (see TS 38. 215 [9], clause 5.1.21). |
| ***rmtc-Periodicity***Indicates the RSSI measurement timing configuration (RMTC) periodicity (see TS 38.215 [9], clause 5.1.21). |
| ***rmtc-SubframeOffset***Indicates the RSSI measurement timing configuration (RMTC) subframe offset for this frequency (see TS 38.215 [9], clause 5.1.21). For inter-frequency measurements, this field is optional present and if it is not configured, the UE chooses a random value as *rmtc-SubframeOffset* for *measDurationSymbols* which shall be selected to be between 0 and the configured *rmtc-Periodicity* with equal probability. |
| ***tci-StateId***Indicates the TCI state to be used for RSSI measurements. This field is only applicable for shared spectrum channel access in FR2-2. Network does not configure this if the UE does not have any serving cells in FR2-2 and in such a case, it is up to UE implementation how to determine the spatial domain filter for the inter-frequency RSSI measurement in FR2-2. |

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| *SSB-ConfigMobility* field descriptions |
| ***cca-CellsToAddModList, cca-CellsToRemoveList***Lists of cells to be added or removed from the list of neighbor cells that apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. |
| ***deriveSSB-IndexFromCell***If this field is set to *true*, UE assumes SFN and frame boundary alignment across cells on the same frequency carrier as specified in TS 38.133 [14]. Hence, if the UE is configured with a serving cell for which (*absoluteFrequencySSB*, *subcarrierSpacing*) in *ServingCellConfigCommon* is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, this field indicates whether the UE can utilize the timing of this serving cell to derive the index of SS block transmitted by neighbour cell. Otherwise, this field indicates whether the UE may use the timing of any detected cell on that target frequency to derive the SSB index of all neighbour cells on that frequency. |
| ***deriveSSB-IndexFromCellInter***If this field is present, UE assumes SFN and frame boundary alignment between the reference serving cell indicated by *ServCellIndex* and all neighbour cells in this *MeasObjectNR* as specified in TS 38.133 [14]. This field also indicates that the UE can utilize the timing of the reference serving cell indicated by *ServCellIndex* to derive the index of SS block transmitted by all inter-frequency neighbour cells on the frequency indicated by the *MeasObjectNR*. When this field is included, the network should set *deriveSSB-IndexFromCell* to *true*. |
| ***ssb-ToMeasure***The set of SS blocks to be measured within the SMTC measurement duration. The first/leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS/PBCH block is not to be measured while value 1 indicates that the corresponding SS/PBCH block is to be measured (see TS 38.215 [9]). When the field is not configured the UE measures on all SS blocks. Regardless of the value of this field, SS/PBCH blocks outside of the applicable *smtc* are not to be measured. See TS 38.215 [9] clause 5.1.1. |

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| *SSB-PositionQCL-CellsToAddMod* field descriptions |
| ***physCellId***Physical cell identity of a cell in the cell list. |
| ***ssb-PositionQCL***Indicates the QCL relation between SS/PBCH blocks for a specific cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by *ssb-PositionQCL-Common*. |

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| Conditional Presence | Explanation |
| *AssociatedGapCSIRS* | This field is optionally present, Need R if *associatedMeasGapCSIRS* is configured, otherwise, it is absent. |
| *AssociatedGapSSB* | This field is optionally present, Need R if *associatedMeasGapSSB* is configured, otherwise, it is absent. |
| *CSI-RS* | This field is mandatory present if *csi-rs-ResourceConfigMobility* is configured, otherwise, it is absent. |
| *IntraFreqConnected* | This field is optionally present, Need R if the UE is configured with a serving cell for which (absoluteFrequencySSB, subcarrierSpacing) in ServingCellConfigCommon is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, otherwise, it is absent. |
| *SCG* | This field is optionallly present, Need R, in the *measConfig* associated with the SCG. It is absent in the *measConfig* associated with the MCG. |
| *SharedSpectrum* | This field is mandatory present if this *MeasObject* is for a frequency which operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | This field is optionally present if this *MeasObject* is for a frequency which operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R. |
| *SSBorAssociatedSSB* | This field is mandatory present if ssb-ConfigMobility is configured or associatedSSB is configured in at least one cell. Otherwise, it is absent, Need R. |

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*END OF CHANGE*