**3GPP TSG-RAN WG2 Meeting #114-e *R2-210xxxx***

**E-meeting, 19th May – 27th May 2021**

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| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **2598** | **rev** | **1** | **Current version:** | **16.4.1** |  |
|  |
| *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:***  | Clarification on the Timing Reference of PSCell SMTC Configuration |
|  |  |
| ***Source to WG:*** | Apple, Xiaomi, ZTE Corporation, Sanechips, Samsung, CATT, Ericsson, OPPO, Nokia |
| ***Source to TSG:*** | R2  |
|  |  |
| ***Work item code:*** | NR\_newRAT-Core, TEI16 |  | ***Date:*** | 2021-05-05 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | In EN-DC, the handover with PSCell addition/change the PSCell SMTC configuration based on PCell timing is only supported when the source and target LTE PCell are SFN and and subframe synchronized. But in NR-DC, in RAN2#113bis meeting, majority view is that UE should apply the target PCell timing as the PSCell SMTC timing reference during the NR handover with PSCell addition/change. Since current spec doesnot reflect majority view to use the target PCell timing as the reference, the spec clarification is needed.  |
|  |  |
| ***Summary of change:*** | Clarify that during the NR handover with PSCell addition/change, if NW provides the PSCell SMTC configuration based on PCell timing, UE should apply the target PCell timing as the reference. **Impact analysis**Impacted 5G architecture options: NR-DC  Impacted functionality: SMTC  Inter-operability: * If the UE implements the CR, but the network doesnot (i.e. provide the SCG SMTC configuration based on source PCell timing), UE couldnot acquire the PSCell DL timing soon if source and target PCell timing is different.
* If the network implements the CR, but the UE doesnot (i.e. follow source PCell timing to determine the PSCell SMTC position), UE couldnot acquire the PSCell DL timing soon if source and target PCell timing is different.
 |
|  |  |
| ***Consequences if not approved:*** | The PSCell SMTC configuration which is provided based on PCell timing is not helpful for UE to acquire the target PSCell DL Timing quickly if the source PCell and target PCell timing is different. |
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| ***Clauses affected:*** | 6.2.2, 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:*** |  |

--------------------------------- [1st Change] ----------------------------

6.2.2 Message definitions

– *RRCReconfiguration*

The *RRCReconfiguration* message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) and AS security configuration.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

***RRCReconfiguration message***

-- ASN1START

-- TAG-RRCRECONFIGURATION-START

RRCReconfiguration ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcReconfiguration RRCReconfiguration-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCReconfiguration-IEs ::= SEQUENCE {

 radioBearerConfig RadioBearerConfig OPTIONAL, -- Need M

 secondaryCellGroup OCTET STRING (CONTAINING CellGroupConfig) OPTIONAL, -- Cond SCG

 measConfig MeasConfig OPTIONAL, -- Need M

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCReconfiguration-v1530-IEs OPTIONAL

}

RRCReconfiguration-v1530-IEs ::= SEQUENCE {

 masterCellGroup OCTET STRING (CONTAINING CellGroupConfig) OPTIONAL, -- Need M

 fullConfig ENUMERATED {true} OPTIONAL, -- Cond FullConfig

 dedicatedNAS-MessageList SEQUENCE (SIZE(1..maxDRB)) OF DedicatedNAS-Message OPTIONAL, -- Cond nonHO

 masterKeyUpdate MasterKeyUpdate OPTIONAL, -- Cond MasterKeyChange

 dedicatedSIB1-Delivery OCTET STRING (CONTAINING SIB1) OPTIONAL, -- Need N

 dedicatedSystemInformationDelivery OCTET STRING (CONTAINING SystemInformation) OPTIONAL, -- Need N

 otherConfig OtherConfig OPTIONAL, -- Need M

 nonCriticalExtension RRCReconfiguration-v1540-IEs OPTIONAL

}

RRCReconfiguration-v1540-IEs ::= SEQUENCE {

 otherConfig-v1540 OtherConfig-v1540 OPTIONAL, -- Need M

 nonCriticalExtension RRCReconfiguration-v1560-IEs OPTIONAL

}

RRCReconfiguration-v1560-IEs ::= SEQUENCE {

 mrdc-SecondaryCellGroupConfig SetupRelease { MRDC-SecondaryCellGroupConfig } OPTIONAL, -- Need M

 radioBearerConfig2 OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL, -- Need M

 sk-Counter SK-Counter OPTIONAL, -- Need N

 nonCriticalExtension RRCReconfiguration-v1610-IEs OPTIONAL

}

RRCReconfiguration-v1610-IEs ::= SEQUENCE {

 otherConfig-v1610 OtherConfig-v1610 OPTIONAL, -- Need M

 bap-Config-r16 SetupRelease { BAP-Config-r16 } OPTIONAL, -- Need M

 iab-IP-AddressConfigurationList-r16 IAB-IP-AddressConfigurationList-r16 OPTIONAL, -- Need M

 conditionalReconfiguration-r16 ConditionalReconfiguration-r16 OPTIONAL, -- Need M

 daps-SourceRelease-r16 ENUMERATED{true} OPTIONAL, -- Need N

 t316-r16 SetupRelease {T316-r16} OPTIONAL, -- Need M

 needForGapsConfigNR-r16 SetupRelease {NeedForGapsConfigNR-r16} OPTIONAL, -- Need M

 onDemandSIB-Request-r16 SetupRelease { OnDemandSIB-Request-r16 } OPTIONAL, -- Need M

 dedicatedPosSysInfoDelivery-r16 OCTET STRING (CONTAINING PosSystemInformation-r16-IEs) OPTIONAL, -- Need N

 sl-ConfigDedicatedNR-r16 SetupRelease {SL-ConfigDedicatedNR-r16} OPTIONAL, -- Need M

 sl-ConfigDedicatedEUTRA-Info-r16 SetupRelease {SL-ConfigDedicatedEUTRA-Info-r16} OPTIONAL, -- Need M

 targetCellSMTC-SCG-r16 SSB-MTC OPTIONAL, -- Need S

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

MRDC-SecondaryCellGroupConfig ::= SEQUENCE {

 mrdc-ReleaseAndAdd ENUMERATED {true} OPTIONAL, -- Need N

 mrdc-SecondaryCellGroup CHOICE {

 nr-SCG OCTET STRING (CONTAINING RRCReconfiguration),

 eutra-SCG OCTET STRING

 }

}

BAP-Config-r16 ::= SEQUENCE {

 bap-Address-r16 BIT STRING (SIZE (10)) OPTIONAL, -- Need M

 defaultUL-BAP-RoutingID-r16 BAP-RoutingID-r16 OPTIONAL, -- Need M

 defaultUL-BH-RLC-Channel-r16 BH-RLC-ChannelID-r16 OPTIONAL, -- Need M

 flowControlFeedbackType-r16 ENUMERATED {perBH-RLC-Channel, perRoutingID, both} OPTIONAL, -- Need R

 ...

}

MasterKeyUpdate ::= SEQUENCE {

 keySetChangeIndicator BOOLEAN,

 nextHopChainingCount NextHopChainingCount,

 nas-Container OCTET STRING OPTIONAL, -- Cond securityNASC

 ...

}

OnDemandSIB-Request-r16 ::= SEQUENCE {

 onDemandSIB-RequestProhibitTimer-r16 ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30}

}

T316-r16 ::= ENUMERATED {ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms1000, ms1500, ms2000}

IAB-IP-AddressConfigurationList-r16 ::= SEQUENCE {

 iab-IP-AddressToAddModList-r16 SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressConfiguration-r16 OPTIONAL, -- Need N

 iab-IP-AddressToReleaseList-r16 SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressIndex-r16 OPTIONAL, -- Need N

 ...

}

IAB-IP-AddressConfiguration-r16 ::= SEQUENCE {

 iab-IP-AddressIndex-r16 IAB-IP-AddressIndex-r16,

 iab-IP-Address-r16 IAB-IP-Address-r16 OPTIONAL, -- Need M

 iab-IP-Usage-r16 IAB-IP-Usage-r16 OPTIONAL, -- Need M

 iab-donor-DU-BAP-Address-r16 BIT STRING (SIZE(10)) OPTIONAL, -- Need M

...

}

SL-ConfigDedicatedEUTRA-Info-r16 ::= SEQUENCE {

 sl-ConfigDedicatedEUTRA-r16 OCTET STRING OPTIONAL, -- Need M

 sl-TimeOffsetEUTRA-List-r16 SEQUENCE (SIZE (8)) OF SL-TimeOffsetEUTRA-r16 OPTIONAL -- Need M

}

SL-TimeOffsetEUTRA-r16 ::= ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot625, ms0dot75, ms1, ms1dot25, ms1dot5, ms1dot75,

 ms2, ms2dot5, ms3, ms4, ms5, ms6, ms8, ms10, ms20}

-- TAG-RRCRECONFIGURATION-STOP

-- ASN1STOP

|  |
| --- |
| ***RRCReconfiguration-IEs* field descriptions** |
| ***bap-Config***This field is used to configure the BAP entity for IAB nodes. |
| ***bap-Address***Indicates the BAP address of an IAB-node. The BAP address of an IAB-node cannot be changed once configured to the BAP entity. |
| ***conditionalReconfiguration***Configuration of candidate target SpCell(s) and execution condition(s) for conditional handover or conditional PSCell change. For conditional PSCell change, this field may only be present in an *RRCReconfiguration* message for intra-SN PSCell change. The network does not configure a UE with both conditional PCell change and conditional PSCell change simultaneously. The field is absent if any DAPS bearer is configured or if the *masterCellGroup* includes *ReconfigurationWithSync*. For conditional PSCell change, the field is absent if the *secondaryCellGroup* includes *ReconfigurationWithSync*. The *RRCReconfiguration* message contained in *DLInformationTransferMRDC* cannot contain the field *conditionalReconfiguration* for conditional PSCell change. |
| ***daps-SourceRelease***Indicates to UE that the source cell part of DAPS operation is to be stopped and the source cell part of DAPS configuration is to be released. |
| ***dedicatedNAS-MessageList***This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.  |
| ***dedicatedPosSysInfoDelivery***This field is used to transfer *SIBPos* to the UE in RRC\_CONNECTED. |
| ***dedicatedSIB1-Delivery***This field is used to transfer *SIB1* to the UE. The field has the same values as the corresponding configuration in *servingCellConfigCommon*. |
| ***dedicatedSystemInformationDelivery***This field is used to transfer *SIB6*, *SIB7*, *SIB8* to the UE with an active BWP with no common serach space configured. For UEs in RRC\_CONNECTED, this field is used to transfer the SIBs requested on-demand. |
| ***defaultUL-BAP-RoutingID***This field is used for IAB-node to configure the default uplink Routing ID, which is used by IAB-node during IAB-node bootstrapping*,* migration, IAB-MT RRC resume and IAB-MT RRC re-establishment for *F1-C* and *non-F1* traffic. The *defaultUL-BAP-RoutingID* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes. This field is mandatory only for IAB-node bootstrapping. |
| ***defaultUL-BH-RLC-Channel***This field is used for IAB-nodes to configure the default uplink BH RLC channel*,* which is used by IAB-nodeduring IAB-node bootstrapping*,* migration, IAB-MT RRC resume and IAB-MT RRC re-establishment *for F1-C and non-F1 traffic*. The *defaultUL-BH-RLC-Channel* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes, and the new IP address is anchored at a different IAB-donor-DU. This field is mandatory for IAB-node bootstrapping. If the IAB-MT is operating in EN-DC, the default uplink BH RLC channel is referring to an RLC channel on the SCG; Otherwise, it is referring to an RLC channel on the MCG. |
| ***flowControlFeedbackType***This field is only used for IAB-node that support hop-by-hop flow control to configure the type of flow control feedback. Value *perBH-RLC-Channel* indicates that the IAB-node shall provide flow control feedback per BH RLC channel, value *perRoutingID* indicates that the IAB-node shall provide flow control feedback per routing ID, and value *both* indicates that the IAB-node shall provide flow control feedback both per BH RLC channel and per routing ID. |
| ***fullConfig***Indicates that the full configuration option is applicable for the *RRCReconfiguration* message for intra-system intra-RAT HO. For inter-RAT HO from E-UTRA to NR, *fullConfig* indicates whether or not delta signalling of SDAP/PDCP from source RAT is applicable. This field is absent if any DAPS bearer is configured or when the *RRCReconfiguration* message is transmitted on SRB3, and in an *RRCReconfiguration* message contained in another *RRCReconfiguration* message (or *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1. |
| ***iab-IP-Address***This field is used to provide the IP address information for IAB-node. |
| ***iab-IP-AddressIndex***This field is used to identify a configuration of an IP address. |
| ***iab-IP-AddressToAddModList***List of IP addresses allocated for IAB-node to be added and modified. |
| ***iab-IP-AddressToReleaseList***List of IP address allocated for IAB-node to be released. |
| ***iab-IP-Usage***This field is used to indicate the usage of the assigned IP address. If this field is not configured, the assigned IP address is used for all traffic. |
| ***iab-donor-DU-BAP-Address***This field is used to indicate the BAP address of the IAB-donor-DU where the IP address is anchored. |
| ***keySetChangeIndicator***Indicates whether UE shall derive a new KgNB. If *reconfigurationWithSync* is included, value *true* indicates that a KgNB key is derived from a KAMF key taken into use through the latest successful NAS SMC procedure, or N2 handover procedure with KAMF change, as described in TS 33.501 [11] for KgNB re-keying. Value *false* indicates that the new KgNB key is obtained from the current KgNB key or from the NH as described in TS 33.501 [11]. |
| ***masterCellGroup***Configuration of master cell group. |
| ***mrdc-ReleaseAndAdd***This field indicates that the current SCG configuration is released and a new SCG is added at the same time. |
| ***mrdc-SecondaryCellGroup***Includes an RRC message for SCG configuration in NR-DC or NE-DC.For NR-DC (nr-SCG), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields *secondaryCellGroup, otherConfig, conditionalReconfiguration* and *measConfig*.For NE-DC (eutra-SCG), *mrdc-SecondaryCellGroup* includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration*. |
| ***nas-Container***This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS security after inter-system handover to NR. The content is defined in TS 24.501 [23]. |
| ***needForGapsConfigNR***Configuration for the UE to report measurement gap requirement information of NR target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message. |
| ***nextHopChainingCount***Parameter NCC: See TS 33.501 [11] |
| ***onDemandSIB-Request***If the field is present, the UE is allowed to request SIB(s) on-demand while in RRC\_CONNECTED according to clause 5.2.2.3.5. |
| ***onDemandSIB-RequestProhibitTimer***Prohibit timer for requesting SIB(s) on-demand while in RRC\_CONNECTED according to clause 5.2.2.3.5. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0dot5 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on. |
| ***otherConfig***Contains configuration related to other configurations. When configured for the SCG, only fields *drx-PreferenceConfig, maxBW-PreferenceConfig, maxCC-PreferenceConfig, maxMIMO-LayerPreferenceConfig*, *minSchedulingOffsetPreferenceConfig, btNameList, wlanNameList, sensorNameList* and *obtainCommonLocation* can be included. |
| ***radioBearerConfig***Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. In EN-DC this field may only be present if the *RRCReconfiguration* is transmitted over SRB3. |
| ***radioBearerConfig2***Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC. |
| ***secondaryCellGroup***Configuration of secondary cell group ((NG)EN-DC or NR-DC). |
| ***sk-Counter***A counter used upon initial configuration of S-KgNB or S-KeNB, as well as upon refresh of S-KgNB or S-KeNB. This field is always included either upon initial configuration of an NR SCG or upon configuration of the first RB with *keyToUse* set to *secondary*, whichever happens first. This field is absent if there is neither any NR SCG nor any RB with *keyToUse* set to *secondary*. |
| ***sl-ConfigDedicatedNR***This field is used to provide the dedicated configurations for NR sidelink communication. |
| ***sl-ConfigDedicatedEUTRA-Info***This field includes the E-UTRA *RRCConnectionReconfiguration* as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA *RRCConnectionReconfiguration* can only includes sidelink related fields for V2X sidelink communication, i.e. *sl-V2X-ConfigDedicated*, *sl-V2X-SPS-Config*, *measConfig* and/or *otherConfig*. |
| ***sl-TimeOffsetEUTRA***This field indicates the possible time offset to (de)activation of V2X sidelink transmission after receiving DCI format 3\_1 used for scheduling V2X sidelink communication. Value *ms0dpt75* corresponds to 0.75ms, *ms1* corresponds to 1ms and so on. The network includes this field only when *sl-ConfigDedicatedEUTRA* is configured. |
| ***targetCellSMTC-SCG***The SSB periodicity/offset/duration configuration of target cell for NR PSCell addition and SN change. When UE receives this field, UE applies the configuration based on the timing reference of NR PCell for PSCell addition and PSCell change for the case of no reconfiguration with sync of MCG, and UE applies the configuration based on the timing reference of target NR PCell for the case of reconfiguration with sync of MCG. If both this field and the *smtc* in *secondaryCellGroup* -> *SpCellConfig* -> *reconfigurationWithSync* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. |
| ***t316***Indicates the value for timer T316 as described in clause 7.1. Value *ms50* corresponds to 50 ms, value *ms100* corresponds to 100 ms and so on. This field can be configured only if the UE is configured with split SRB1 or SRB3. |

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| **Conditional Presence** | **Explanation** |
| *nonHO* | The field is absent in case of reconfiguration with sync within NR or to NR; otherwise it is optionally present, need N. |
| *securityNASC* | This field is mandatory present in case of inter system handover. Otherwise the field is optionally present, need N. |
| *MasterKeyChange* | This field is mandatory present in case *masterCellGroup* includes *ReconfigurationWithSync* and *RadioBearerConfig* includes *SecurityConfig* with *SecurityAlgorithmConfig*, indicating a change of the AS security algorithms associated to the master key. If *ReconfigurationWithSync* is included for other cases, this field is optionally present, need N. Otherwise the field is absent. |
| *FullConfig* | The field is mandatory present in case of inter-system handover from E-UTRA/EPC to NR. It is optionally present, Need N, during reconfiguration with sync and also in first reconfiguration after reestablishment; or for intra-system handover from E-UTRA/5GC to NR. It is absent otherwise. |
| *SCG* | The field is optional present, Need M, in:- an *RRCReconfiguration* message transmitted on SRB3,- an *RRCReconfiguration* message contained in another *RRCReconfiguration* message (or in an *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1- an *RRCReconfiguration* message contained in another *RRCReconfiguration* message (or in an *RRCConnectionReconfiguration* message, see TS 36.331 [10]) which is contained in *DLInformationTransferMRDC* transmitted on SRB3 (as a response to *ULInformationTransferMRDC* including an *MCGFailureInformation*)- in an *RRCReconfiguration* message contained in an *RRCResume* message (or in an *RRCConnectionResume* message, see TS 36.331 [10]).Otherwise, the field is absent |

--------------------------------- [2nd Change] ----------------------------

6.3.2 Radio resource control information elements

– *CellGroupConfig*

The *CellGroupConfig* IE is used to configure a master cell group (MCG) or secondary cell group (SCG). A cell group comprises of one MAC entity, a set of logical channels with associated RLC entities and of a primary cell (SpCell) and one or more secondary cells (SCells).

***CellGroupConfig* information element**

-- ASN1START

-- TAG-CELLGROUPCONFIG-START

-- Configuration of one Cell-Group:

CellGroupConfig ::= SEQUENCE {

 cellGroupId CellGroupId,

 rlc-BearerToAddModList SEQUENCE (SIZE(1..maxLC-ID)) OF RLC-BearerConfig OPTIONAL, -- Need N

 rlc-BearerToReleaseList SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity OPTIONAL, -- Need N

 mac-CellGroupConfig MAC-CellGroupConfig OPTIONAL, -- Need M

 physicalCellGroupConfig PhysicalCellGroupConfig OPTIONAL, -- Need M

 spCellConfig SpCellConfig OPTIONAL, -- Need M

 sCellToAddModList SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellConfig OPTIONAL, -- Need N

 sCellToReleaseList SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellIndex OPTIONAL, -- Need N

 ...,

 [[

 reportUplinkTxDirectCurrent ENUMERATED {true} OPTIONAL -- Cond BWP-Reconfig

 ]],

 [[

 bap-Address-r16 BIT STRING (SIZE (10)) OPTIONAL, -- Need M

 bh-RLC-ChannelToAddModList-r16 SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelConfig-r16 OPTIONAL, -- Need N

 bh-RLC-ChannelToReleaseList-r16 SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelID-r16 OPTIONAL, -- Need N

 f1c-TransferPath-r16 ENUMERATED {lte, nr, both} OPTIONAL, -- Need M

 simultaneousTCI-UpdateList1-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 simultaneousTCI-UpdateList2-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 simultaneousSpatial-UpdatedList1-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 simultaneousSpatial-UpdatedList2-r16 SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R

 uplinkTxSwitchingOption-r16 ENUMERATED {switchedUL, dualUL} OPTIONAL, -- Need R

 uplinkTxSwitchingPowerBoosting-r16 ENUMERATED {enabled} OPTIONAL -- Need R

 ]],

 [[

 reportUplinkTxDirectCurrentTwoCarrier-r16 ENUMERATED {true} OPTIONAL -- Need N

 ]]

}

-- Serving cell specific MAC and PHY parameters for a SpCell:

SpCellConfig ::= SEQUENCE {

 servCellIndex ServCellIndex OPTIONAL, -- Cond SCG

 reconfigurationWithSync ReconfigurationWithSync OPTIONAL, -- Cond ReconfWithSync

 rlf-TimersAndConstants SetupRelease { RLF-TimersAndConstants } OPTIONAL, -- Need M

 rlmInSyncOutOfSyncThreshold ENUMERATED {n1} OPTIONAL, -- Need S

 spCellConfigDedicated ServingCellConfig OPTIONAL, -- Need M

 ...

}

ReconfigurationWithSync ::= SEQUENCE {

 spCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Need M

 newUE-Identity RNTI-Value,

 t304 ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},

 rach-ConfigDedicated CHOICE {

 uplink RACH-ConfigDedicated,

 supplementaryUplink RACH-ConfigDedicated

 } OPTIONAL, -- Need N

 ...,

 [[

 smtc SSB-MTC OPTIONAL -- Need S

 ]],

 [[

 daps-UplinkPowerConfig-r16 DAPS-UplinkPowerConfig-r16 OPTIONAL -- Need N

 ]]

}

DAPS-UplinkPowerConfig-r16 ::= SEQUENCE {

 p-DAPS-Source-r16 P-Max,

 p-DAPS-Target-r16 P-Max,

 uplinkPowerSharingDAPS-Mode-r16 ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }

}

SCellConfig ::= SEQUENCE {

 sCellIndex SCellIndex,

 sCellConfigCommon ServingCellConfigCommon OPTIONAL, -- Cond SCellAdd

 sCellConfigDedicated ServingCellConfig OPTIONAL, -- Cond SCellAddMod

 ...,

 [[

 smtc SSB-MTC OPTIONAL -- Need S

 ]],

 [[

 sCellState-r16 ENUMERATED {activated} OPTIONAL, -- Cond SCellAddSync

 secondaryDRX-GroupConfig-r16 ENUMERATED {true} OPTIONAL -- Cond DRX-Config2

 ]]}

-- TAG-CELLGROUPCONFIG-STOP

-- ASN1STOP

|  |
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| ***CellGroupConfig* field descriptions** |
| ***bap-Address***BAP address of the parent node in cell group. |
| ***bh-RLC-ChannelToAddModList***Configuration of the backhaul RLC entities and the corresponding MAC Logical Channels to be added and modified. |
| ***bh-RLC-ChannelToReleaseList***List of the backhaul RLC entities and the corresponding MAC Logical Channels to be released. |
| ***f1c-TransferPath***The F1-C transfer path that an EN-DC IAB-MT should use for transferring F1-C packets to the IAB-donor-CU. If IAB-MT is configured with *lte*, IAB-MT can only use LTE leg for F1-C transfer. If IAB-MT is configured with *nr*, IAB-MT can only use NR leg for F1-C transfer. If IAB-MT is configured with *both*, it is up to IAB-MT to select an LTE leg or a NR leg for F1-C transfer. If the field is not configured, the IAB node uses the NR leg as the default one. |
| ***mac-CellGroupConfig***MAC parameters applicable for the entire cell group. |
| ***rlc-BearerToAddModList***Configuration of the MAC Logical Channel, the corresponding RLC entities and association with radio bearers. |
| ***reportUplinkTxDirectCurrent***Enables reporting of uplink and supplementary uplink Direct Current location information upon BWP configuration and reconfiguration. This field is only present when the BWP configuration is modified or any serving cell is added or removed. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. If UE is configured with SUL carrier, UE reports both UL and SUL Direct Current locations. |
| ***reportUplinkTxDirectCurrentTwoCarrier***Enables reporting of uplink Direct Current location information when the UE is configured with uplink intra-band CA with two carriers. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. |
| ***rlmInSyncOutOfSyncThreshold***BLER threshold pair index for IS/OOS indication generation, see TS 38.133 [14], table 8.1.1-1. *n1* corresponds to the value 1. When the field is absent, the UE applies the value 0. Whenever this is reconfigured, UE resets N310 and N311, and stops T310, if running. Network does not include this field. |
| ***sCellState***Indicates whether the SCell shall be considered to be in activated state upon SCell configuration. |
| ***sCellToAddModList***List of secondary serving cells (SCells) to be added or modified. |
| ***sCellToReleaseList***List of secondary serving cells (SCells) to be released. |
| ***secondaryDRX-GroupConfig***The field is used to indicate whether the SCell belongs to the secondary DRX group. All serving cells in the secondary DRX group shall belong to one Frequency Range and all serving cells in the legacy DRX group shall belong to another Frequency Range. |
| ***simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2***List of serving cells which can be updated simultaneously for TCI relation with a MAC CE. The *simultaneousTCI-UpdateList1* and *simultaneousTCI-UpdateList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists. |
| ***simultaneousSpatial-UpdatedList1, simultaneousSpatial-UpdatedList2***List of serving cells which can be updated simultaneously for spatial relation with a MAC CE. The *simultaneousSpatial-UpdatedList1* and *simultaneousSpatial-UpdatedList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists. |
| ***spCellConfig***Parameters for the SpCell of this cell group (PCell of MCG or PSCell of SCG).  |
| ***uplinkTxSwitchingOption***Indicates which option is configured for dynamic UL Tx switching for inter-band UL CA or (NG)EN-DC. The field is set to *switchedUL* if network configures option 1 as specified in TS 38.214 [19], or *dualUL* if network configures option 2 as specified in TS 38.214 [19]. Network always configures UE with a value for this field in inter-band UL CA case and (NG)EN-DC case where UE supports dynamic UL Tx switching. |
| ***uplinkTxSwitchingPowerBoosting***Indicates whether the UE is allowed to enable 3dB boosting on the maximum output power for transmission on carrier2 under the operation state in which 2-port transmission can be supported on carrier2 for inter-band UL CA case with dynamic UL Tx switching as defined in TS 38.101-1 [15]. Network can only configure this field for dynamic UL Tx switching in inter-band UL CA case with power Class 3 as defined in TS 38.101-1 [15]. |

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| ***DAPS-UplinkPowerConfig* field descriptions** |
| ***p-DAPS-Source***The maximum total transmit power to be used by the UE in the source cell group during DAPS handover. |
| ***p-DAPS-Target***The maximum total transmit power to be used by the UE in the target cell group during DAPS handover. |
| ***uplinkPowerSharingDAPS-Mode***Indicates the uplink power sharing mode that the UE uses in DAPS handover (see TS 38.213 [13]). |

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| ***ReconfigurationWithSync* field descriptions** |
| ***rach-ConfigDedicated***Random access configuration to be used for the reconfiguration with sync (e.g. handover). The UE performs the RA according to these parameters in the *firstActiveUplinkBWP* (see *UplinkConfig*). |
| ***smtc***The SSB periodicity/offset/duration configuration of target cell for NR PSCell change, NR PCell change and NR PSCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *spCellConfigCommon*. For case of NR PSell addition in (NG)EN-DC and NR PCell change, the *smtc* is based on the timing reference of (source) PCell. For case of NR PSCell addition in NR-DC, the *smtc* is based on the timing reference of (target) PCell. For case of NR PSCell change, it is based on the timing reference of source PSCell. If both this field and *targetCellSMTC-SCG* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. |

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| ***SCellConfig* field descriptions** |
| ***smtc***The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *sCellConfigCommon*. The *smtc* is based on the timing of the SpCell of associated cell group. In case of inter-RAT handover to NR, the timing reference is the NR PCell. In case of intra-NR PCell change (standalone NR) or NR PSCell change (EN-DC), the timing reference is the target SpCell. If the field is absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. |

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| ***SpCellConfig* field descriptions** |
| ***reconfigurationWithSync***Parameters for the synchronous reconfiguration to the target SpCell. |
| ***rlf-TimersAndConstants***Timers and constants for detecting and triggering cell-level radio link failure. For the SCG, *rlf-TimersAndConstants* can only be set to *setup* and is always included at SCG addition. |
| ***servCellIndex***Serving cell ID of a PSCell. The PCell of the Master Cell Group uses ID = 0. |

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| **Conditional Presence** | **Explanation** |
| *BWP-Reconfig* | The field is optionally present, Need N, if the BWPs are reconfigured or if serving cells are added or removed. Otherwise it is absent.  |
| *DRX-Config2* | The field is optionally present, Need N, if *drx-ConfigSecondaryGroup* is configured. It is absent otherwise. |
| *ReconfWithSync* | The field is mandatory present in the *RRCReconfiguration* message:- in each configured *CellGroupConfig* for which the SpCell changes,- in the *masterCellGroup* at change of AS security key derived from KgNB,- in the *secondaryCellGroup* at:- PSCell addition,- SCG resume with NR-DC or (NG)EN-DC,- update of required SI for PSCell,- change of AS security key derived from S-KgNB while the UE is configured with at least one radio bearer with *keyToUse* set to *secondary* and that is not released by this *RRCReconfiguration* message,Otherwise, it is optionally present, need M. The field is absent in the *masterCellGroup* in *RRCResume* and *RRCSetup* messages and is absent in the *masterCellGroup* in *RRCReconfiguration* messages if source configuration is not released during DAPS handover. |
| *SCellAdd* | The field is mandatory present upon SCell addition; otherwise it is absent, Need M. |
| *SCellAddMod* | The field is mandatory present upon SCell addition; otherwise it is optionally present, need M. |
| *SCellAddSync* | The field is optionally present, Need N, in case of SCell addition, reconfiguration with sync, and resuming an RRC connection. It is absent otherwise. |
| *SCG* | The field is mandatory present in an *SpCellConfig* for the PSCell. It is absent otherwise.  |

NOTE: In case of change of AS security key derived from S-KgNB/S-KeNB, if *reconfigurationWithSync* is not included in the *masterCellGroup*, the network releases all existing MCG RLC bearers associated with a radio bearer with *keyToUse* set to *secondary*. In case of change of AS security key derived from KgNB/KeNB, if *reconfigurationWithSync* is not included in the *secondaryCellGroup*, the network releases all existing SCG RLC bearers associated with a radio bearer with *keyToUse* set to *primary*.

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