**3GPP TSG-RAN WG2 Meeting #111-e *R2-2008589***

**Online, 17th – 28th August 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **36.331** | **CR** | **4447** | **rev** |  | **Current version:** | **16.1.1** |  |
|  | | | | | | | | |
| *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 | **X** |

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| ***Title:*** | System support for Wake Up Signal | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NB\_IOTenh2-Core, LTE\_eMTC4-Core | | | | |  | ***Date:*** | | | 2020-09-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **A** |  | | | | | ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | SA2 sent LS (R2-200068/S2-2001578, R2-2004317/S2-2003217) indicating that SA2 has discussed the impact of WUS on the MME paging strategy and concluded that with some MME paging strategies, e.g. always paging a UE in the entire TA list, this may lead to increased power consumption for UEs using WUS.  SA2 has approved a CR which restricts the usage of WUS to the last used cell (i.e. the cell in which the UE’s RRC connection was last released/ suspended).  SA2 also sent LS (R2-2008544/S2-2006478) indicating that the scenario where a UE could be unreachable for a period if it remains in the same cell, after a release occurs and the S1 connection was not established, exists and be better addressed at RAN level. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce a parameter *earlyRelease* in *RRCConnectionRelease(-NB)* message to indicate that the RRC Connection is rejected and that the connection to the CN was not established.  **Impact analysis**  Impacted functionality:  Paging with Wake Up Signal  Inter-operability:  If the UE is implemented according to this CR and the network is not, there is no inter-operability issue.  If the network is implemented according to the CR and the UE is not, the UE may misinterpret the non indication of WUS and miss the paging.  Backward compatibiliy:  The CR is considered mandatory to support R16. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Depending of MME paging strategy, (G)WUS may increase rather than decrease UE power consumption | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.2, 6.7.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 23.401 CR 3583  TS 23.501 CR 2407  TS 25.502 CR 2345  TS 36.300 CR 1265  TS 36.304 CR 0796 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Functionally, this CR is a mirror of CR 4446. It also applies to R16 GWUS and connection to 5GC. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## 6.2 RRC messages

#### – *RRCConnectionRelease*

The *RRCConnectionRelease* message is used to command the release of an RRC connection, or to complete an UP-EDT procedure.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E‑UTRAN to UE

*RRCConnectionRelease message*

-- ASN1START

RRCConnectionRelease ::= SEQUENCE {

rrc-TransactionIdentifier RRC-TransactionIdentifier,

criticalExtensions CHOICE {

c1 CHOICE {

rrcConnectionRelease-r8 RRCConnectionRelease-r8-IEs,

spare3 NULL, spare2 NULL, spare1 NULL

},

criticalExtensionsFuture SEQUENCE {}

}

}

RRCConnectionRelease-r8-IEs ::= SEQUENCE {

releaseCause ReleaseCause,

redirectedCarrierInfo RedirectedCarrierInfo OPTIONAL, -- Need ON

idleModeMobilityControlInfo IdleModeMobilityControlInfo OPTIONAL, -- Need OP

nonCriticalExtension RRCConnectionRelease-v890-IEs OPTIONAL

}

RRCConnectionRelease-v890-IEs ::= SEQUENCE {

lateNonCriticalExtension OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs) OPTIONAL,

nonCriticalExtension RRCConnectionRelease-v920-IEs OPTIONAL

}

-- Late non critical extensions

RRCConnectionRelease-v9e0-IEs ::= SEQUENCE {

redirectedCarrierInfo-v9e0 RedirectedCarrierInfo-v9e0 OPTIONAL, -- Cond NoRedirect-r8

idleModeMobilityControlInfo-v9e0 IdleModeMobilityControlInfo-v9e0 OPTIONAL, -- Cond IdleInfoEUTRA

nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- Regular non critical extensions

RRCConnectionRelease-v920-IEs ::= SEQUENCE {

cellInfoList-r9 CHOICE {

geran-r9 CellInfoListGERAN-r9,

utra-FDD-r9 CellInfoListUTRA-FDD-r9,

utra-TDD-r9 CellInfoListUTRA-TDD-r9,

...,

utra-TDD-r10 CellInfoListUTRA-TDD-r10

} OPTIONAL, -- Cond Redirection

nonCriticalExtension RRCConnectionRelease-v1020-IEs OPTIONAL

}

RRCConnectionRelease-v1020-IEs ::= SEQUENCE {

extendedWaitTime-r10 INTEGER (1..1800) OPTIONAL, -- Need ON

nonCriticalExtension RRCConnectionRelease-v1320-IEs OPTIONAL

}

RRCConnectionRelease-v1320-IEs::= SEQUENCE {

resumeIdentity-r13 ResumeIdentity-r13 OPTIONAL, -- Need OR

nonCriticalExtension RRCConnectionRelease-v1530-IEs OPTIONAL

}

RRCConnectionRelease-v1530-IEs ::= SEQUENCE {

drb-ContinueROHC-r15 ENUMERATED {true} OPTIONAL, -- Cond UP-EDT

nextHopChainingCount-r15 NextHopChainingCount OPTIONAL, -- Cond EarlySec

measIdleConfig-r15 MeasIdleConfigDedicated-r15 OPTIONAL, -- Need ON

rrc-InactiveConfig-r15 RRC-InactiveConfig-r15 OPTIONAL, -- Need OR

cn-Type-r15 ENUMERATED {epc,fivegc} OPTIONAL, -- Need OR

nonCriticalExtension RRCConnectionRelease-v1540-IEs OPTIONAL

}

RRCConnectionRelease-v1540-IEs ::= SEQUENCE {

waitTime INTEGER (1..16) OPTIONAL, -- Cond 5GC

nonCriticalExtension RRCConnectionRelease-v15b0-IEs OPTIONAL

}

RRCConnectionRelease-v15b0-IEs ::= SEQUENCE {

earlyRelease-r15 ENUMERATED {true} OPTIONAL, -- Need OP

nonCriticalExtension RRCConnectionRelease-v1610-IEs OPTIONAL

}

RRCConnectionRelease-v1610-IEs ::= SEQUENCE {

resumeIdentity-r16 I-RNTI-r15 OPTIONAL, -- Need OR

pur-Config-r16 SetupRelease {PUR-Config-r16} OPTIONAL, -- Need ON

rrc-InactiveConfig-v1610 RRC-InactiveConfig-v1610 OPTIONAL, -- Cond BLCE-IDLEeDRX

releaseIdleMeasConfig ENUMERATED {true} OPTIONAL, -- Need ON

altFreqPriorities-r16 ENUMERATED {true} OPTIONAL, -- Need ON

t323-r16 ENUMERATED {

min5, min10, min20, min30, min60, min120, min180,

min720} OPTIONAL, -- Need OR

nonCriticalExtension SEQUENCE {} OPTIONAL

}

ReleaseCause ::= ENUMERATED {loadBalancingTAUrequired,

other, cs-FallbackHighPriority-v1020, rrc-Suspend-v1320}

RedirectedCarrierInfo ::= CHOICE {

eutra ARFCN-ValueEUTRA,

geran CarrierFreqsGERAN,

utra-FDD ARFCN-ValueUTRA,

utra-TDD ARFCN-ValueUTRA,

cdma2000-HRPD CarrierFreqCDMA2000,

cdma2000-1xRTT CarrierFreqCDMA2000,

...,

utra-TDD-r10 CarrierFreqListUTRA-TDD-r10,

nr-r15 CarrierInfoNR-r15

}

RedirectedCarrierInfo-v9e0 ::= SEQUENCE {

eutra-v9e0 ARFCN-ValueEUTRA-v9e0

}

RRC-InactiveConfig-r15::= SEQUENCE {

fullI-RNTI-r15 I-RNTI-r15,

shortI-RNTI-r15 ShortI-RNTI-r15,

ran-PagingCycle-r15 ENUMERATED { rf32, rf64, rf128, rf256} OPTIONAL, --Need OR

ran-NotificationAreaInfo-r15 RAN-NotificationAreaInfo-r15 OPTIONAL, --Need ON

periodic-RNAU-timer-r15 ENUMERATED {min5, min10, min20, min30, min60,

min120, min360, min720} OPTIONAL, --Need OR

nextHopChainingCount-r15 NextHopChainingCount OPTIONAL, --Cond INACTIVE

dummy SEQUENCE{} OPTIONAL

}

RRC-InactiveConfig-v1610::= SEQUENCE {

ran-PagingCycle-v1610 ENUMERATED {rf512, rf1024}

}

RAN-NotificationAreaInfo-r15 ::= CHOICE {

cellList-r15 PLMN-RAN-AreaCellList-r15,

ran-AreaConfigList-r15 PLMN-RAN-AreaConfigList-r15

}

PLMN-RAN-AreaCellList-r15 ::= SEQUENCE (SIZE (1..maxPLMN-r15)) OF PLMN-RAN-AreaCell-r15

PLMN-RAN-AreaCell-r15 ::= SEQUENCE {

plmn-Identity-r15 PLMN-Identity OPTIONAL,

ran-AreaCells-r15 SEQUENCE (SIZE (1..32)) OF CellIdentity

}

PLMN-RAN-AreaConfigList-r15 ::= SEQUENCE (SIZE (1..maxPLMN-r15)) OF PLMN-RAN-AreaConfig-r15

PLMN-RAN-AreaConfig-r15 ::= SEQUENCE {

plmn-Identity-r15 PLMN-Identity OPTIONAL,

ran-Area-r15 SEQUENCE (SIZE (1..16)) OF RAN-AreaConfig-r15

}

RAN-AreaConfig-r15 ::= SEQUENCE {

trackingAreaCode-5GC-r15 TrackingAreaCode-5GC-r15,

ran-AreaCodeList-r15 SEQUENCE (SIZE (1..32)) OF RAN-AreaCode-r15 OPTIONAL --Need OR

}

CarrierFreqListUTRA-TDD-r10 ::= SEQUENCE (SIZE (1..maxFreqUTRA-TDD-r10)) OF ARFCN-ValueUTRA

IdleModeMobilityControlInfo ::= SEQUENCE {

freqPriorityListEUTRA FreqPriorityListEUTRA OPTIONAL, -- Need ON

freqPriorityListGERAN FreqsPriorityListGERAN OPTIONAL, -- Need ON

freqPriorityListUTRA-FDD FreqPriorityListUTRA-FDD OPTIONAL, -- Need ON

freqPriorityListUTRA-TDD FreqPriorityListUTRA-TDD OPTIONAL, -- Need ON

bandClassPriorityListHRPD BandClassPriorityListHRPD OPTIONAL, -- Need ON

bandClassPriorityList1XRTT BandClassPriorityList1XRTT OPTIONAL, -- Need ON

t320 ENUMERATED {

min5, min10, min20, min30, min60, min120, min180,

spare1} OPTIONAL, -- Need OR

...,

[[ freqPriorityListExtEUTRA-r12 FreqPriorityListExtEUTRA-r12 OPTIONAL -- Need ON

]],

[[ freqPriorityListEUTRA-v1310 FreqPriorityListEUTRA-v1310 OPTIONAL, -- Need ON

freqPriorityListExtEUTRA-v1310 FreqPriorityListExtEUTRA-v1310 OPTIONAL -- Need ON

]],

[[ freqPriorityListNR-r15 FreqPriorityListNR-r15 OPTIONAL -- Need ON

]]

}

IdleModeMobilityControlInfo-v9e0 ::= SEQUENCE {

freqPriorityListEUTRA-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v9e0

}

FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityListExtEUTRA-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-r12

FreqPriorityListEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310

FreqPriorityListExtEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310

FreqPriorityEUTRA ::= SEQUENCE {

carrierFreq ARFCN-ValueEUTRA,

cellReselectionPriority CellReselectionPriority

}

FreqPriorityEUTRA-v9e0 ::= SEQUENCE {

carrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Cond EARFCN-max

}

FreqPriorityEUTRA-r12 ::= SEQUENCE {

carrierFreq-r12 ARFCN-ValueEUTRA-r9,

cellReselectionPriority-r12 CellReselectionPriority

}

FreqPriorityEUTRA-v1310 ::= SEQUENCE {

cellReselectionSubPriority-r13 CellReselectionSubPriority-r13 OPTIONAL -- Need ON

}

FreqPriorityListNR-r15 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityNR-r15

FreqPriorityNR-r15 ::= SEQUENCE {

carrierFreq-r15 ARFCN-ValueNR-r15,

cellReselectionPriority-r15 CellReselectionPriority,

cellReselectionSubPriority-r15 CellReselectionSubPriority-r13 OPTIONAL -- Need OR

}

FreqsPriorityListGERAN ::= SEQUENCE (SIZE (1..maxGNFG)) OF FreqsPriorityGERAN

FreqsPriorityGERAN ::= SEQUENCE {

carrierFreqs CarrierFreqsGERAN,

cellReselectionPriority CellReselectionPriority

}

FreqPriorityListUTRA-FDD ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF FreqPriorityUTRA-FDD

FreqPriorityUTRA-FDD ::= SEQUENCE {

carrierFreq ARFCN-ValueUTRA,

cellReselectionPriority CellReselectionPriority

}

FreqPriorityListUTRA-TDD ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF FreqPriorityUTRA-TDD

FreqPriorityUTRA-TDD ::= SEQUENCE {

carrierFreq ARFCN-ValueUTRA,

cellReselectionPriority CellReselectionPriority

}

BandClassPriorityListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriorityHRPD

BandClassPriorityHRPD ::= SEQUENCE {

bandClass BandclassCDMA2000,

cellReselectionPriority CellReselectionPriority

}

BandClassPriorityList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriority1XRTT

BandClassPriority1XRTT ::= SEQUENCE {

bandClass BandclassCDMA2000,

cellReselectionPriority CellReselectionPriority

}

CellInfoListGERAN-r9 ::= SEQUENCE (SIZE (1..maxCellInfoGERAN-r9)) OF CellInfoGERAN-r9

CellInfoGERAN-r9 ::= SEQUENCE {

physCellId-r9 PhysCellIdGERAN,

carrierFreq-r9 CarrierFreqGERAN,

systemInformation-r9 SystemInfoListGERAN

}

CarrierInfoNR-r15 ::= SEQUENCE {

carrierFreq-r15 ARFCN-ValueNR-r15,

subcarrierSpacingSSB-r15 ENUMERATED {kHz15, kHz30, kHz120, kHz240},

smtc-r15 MTC-SSB-NR-r15 OPTIONAL -- Need OP

}

CellInfoListUTRA-FDD-r9 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-FDD-r9

CellInfoUTRA-FDD-r9 ::= SEQUENCE {

physCellId-r9 PhysCellIdUTRA-FDD,

utra-BCCH-Container-r9 OCTET STRING

}

CellInfoListUTRA-TDD-r9 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r9

CellInfoUTRA-TDD-r9 ::= SEQUENCE {

physCellId-r9 PhysCellIdUTRA-TDD,

utra-BCCH-Container-r9 OCTET STRING

}

CellInfoListUTRA-TDD-r10 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r10

CellInfoUTRA-TDD-r10 ::= SEQUENCE {

physCellId-r10 PhysCellIdUTRA-TDD,

carrierFreq-r10 ARFCN-ValueUTRA,

utra-BCCH-Container-r10 OCTET STRING

}

-- ASN1STOP

| *RRCConnectionRelease* field descriptions |
| --- |
| ***altFreqPriorities***  Indicates that the UE shall apply the alternative cell reselectionpriorities, when available. This field is not configured together with *idleModeMobilityControlInfo*. |
| ***carrierFreq or bandClass***  The carrier frequency (UTRA, E-UTRA, and NR) and band class (HRPD and 1xRTT) for which the associated cellReselectionPriority is applied. For NR, the *ARFCN-ValueNR* corresponds to a GSCN value as specified in TS 38.101 [85]. |
| ***carrierFreqs***  The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies. |
| ***cellInfoList***  Used to provide system information of one or more cells on the redirected inter-RAT carrier frequency. The system information can be used if, upon redirection, the UE selects an inter-RAT cell indicated by the *physCellId* and *carrierFreq* (GERAN and UTRA TDD) or by the *physCellId* (other RATs). The choice shall match the *redirectedCarrierInfo*. In particular, E-UTRAN only applies value *utra-TDD-r10* in case *redirectedCarrierInfo* is set to *utra-TDD-r10*. |
| ***cellList***  Indicates a list of cells configured as RAN area. For each element, in the absence of *plmn-Identity* the UE considers the registered PLMN. Total number of cells across all PLMNs does not exceed 32. |
| ***cn-Type***  The*cn-Type* is used to indicate that the UE is redirected from 5GC to EPC or 5GC when*redirectedCarrierInfo* indicates E-UTRA frequency. |
| ***drb-ContinueROHC***  This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues when UE initiates UP-EDT in the same cell, while absence indicates that the header compression protocol context is reset. |
| ***dummy***  This field is not used in the specification. If received it shall be ignored by the UE. |
| ***earlyRelease***  Presence of the field indicates that the connection has been released without establishing the connection to the CN. |
| ***extendedWaitTime***  Value in seconds for the wait time for Delay Tolerant access requests. |
| ***freqPriorityListX***  Provides a cell reselection priority for each frequency, by means of separate lists for each RAT (including E-UTRA). The UE shall be able to store at least 3 occurrences of *FreqsPriorityGERAN*. If E-UTRAN includes *freqPriorityListEUTRA-v9e0* and/or *freqPriorityListEUTRA-v1310* it includes the same number of entries, and listed in the same order, as in *freqPriorityListEUTRA* (i.e. without suffix). Field *freqPriorityListExt* includes additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. EUTRAN only includes *freqPriorityListExtEUTRA* if *freqPriorityListEUTRA* (i.e without suffix) includes *maxFreq* entries. If E-UTRAN includes *freqPriorityListExtEUTRA-v1310* it includes the same number of entries, and listed in the same order, as in *freqPriorityListExtEUTRA-r12.* |
| ***idleModeMobilityControlInfo***  Provides dedicated cell reselection priorities. Used for cell reselection as specified in TS 36.304 [4]. For E-UTRA and UTRA frequencies, a UE that supports multi-band cells for the concerned RAT considers the dedicated priorities to be common for all overlapping bands (i.e. regardless of the ARFCN that is used). |
| ***measIdleConfig***  Indicates a one-shot measurement configuration to be stored and used by the UE while in RRC\_IDLE or RRC\_INACTIVE. |
| ***periodic-RNAU-timer***  Refers to the timer that triggers the periodic RNAU procedure in UE. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. |
| ***ran-Area***  Indicates whether TA code(s) or RAN area code(s) are used for the RAN notification area. The network uses only TA code(s) or RAN area code(s) to configure a UE. Total number of TACs across all PLMNs does not exceed 16. Total number of RAN-AreaCode across all PLMNs does not exceed 32. |
| ***ran-NotificationAreaInfo***  Network ensures that the UE in RRC\_INACTIVE always has a valid *ran-NotificationAreaInfo*. |
| ***ranAreaConfigList***  Indicates a list of RAN area codes or RA code(s) as RAN area. For each element, in the absence of *plmn-Identity* the UE considers the registered PLMN. |
| ***ran-pagingCycle***  Refers to the UE specific cycle for RAN-initiated paging. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on. |
| ***redirectedCarrierInfo***  The r*edirectedCarrierInfo* indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an E‑UTRA or an inter-RAT carrier frequency, by means of the cell selection upon leaving RRC\_CONNECTED as specified in TS 36.304 [4]. The value *geran* can only be included after successful security activation when UE is connected to 5GC. |
| ***releaseCause***  The *releaseCause* is used to indicate the reason for releasing the RRC Connection. The cause value *cs-FallbackHighPriority* is only applicable when *redirectedCarrierInfo* is present with the value set to *utra-FDD,* *utra-TDD* or *utra-TDD-r10*. E-UTRAN should not set the *releaseCause* to *loadBalancingTAURequired* or to *cs-FallbackHighPriority* if the *extendedWaitTime* is present. The network should not set the *releaseCause* to *loadBalancingTAURequired* if the UE is connected to 5GC. The network does not set the *releaseCause* to *rrc-Suspend* if the UE is configured with a DAPS bearer, i.e. if source PCell resources after a DAPS handover have not been released. |
| ***releaseIdleMeasConfig***  Indicates that the UE shall release the idle/inactive measurement configurations, if configured. |
| ***rrc-InactiveConfig***  Indicates configuration for the RRC\_INACTIVE state. The network does not configure this field when the UE is redirected to an inter-RAT carrier frequency or if the UE is configured with a DAPS bearer. |
| ***smtc***  The SSB periodicity/offset/duration configuration of the redirected target NR frequency. It is based on the timing reference of EUTRAN PCell. If the field is absent, the UE uses the SMTC configured in the *measObjectNR* having the same SSB frequency and subcarrier spacing |
| ***subcarrierSpacingSSB***  Indicate subcarrier spacing of SSB of redirected target NR frequency. Only the values 15 or 30 (<6GHz), 120 kHz or 240 kHz (>6GHz) are applicable. |
| ***systemInformation***  Container for system information of the GERAN cell i.e. one or more System Information (SI) messages as defined in TS 44.018 [45], table 9.1.1. |
| ***t320***  Timer T320 as described in clause 7.3. Value minN corresponds to N minutes. |
| ***t323***  Timer T323 as described in clause 7.3. Value minN corresponds to N minutes. |
| ***utra-BCCH-Container***  Contains System Information Container message as defined in TS 25.331 [19]. |
| ***waitTime***  Wait time value in seconds. |

| Conditional presence | Explanation |
| --- | --- |
| *5GC* | The field is optionally present, Need ON, if the UE is connected to 5GC; otherwise the field is not present. |
| *BLCE-IDLEeDRX* | The field is optionally present, Need OR, if the UE is a BL UE or UE in CE and the UE is connected to 5GC and IDLE mode eDRX is configured and *ran-PagingCycle-r15* is absent; otherwise the field is not present. | |
| *EARFCN-max* | The field is mandatory present if the corresponding *carrierFreq* (i.e. without suffix) is set to *maxEARFCN*. Otherwise the field is not present. |
| *EarlySec* | When the UE is connected to 5GC, the field is mandatory present. When the UE is connected to EPC, the field is optionally present, Need ON, if the UE supports UP-EDT or UP transmission using PUR or early security reactivation and *releaseCause* is set to *rrc-Suspend*; otherwise the field is not present. | |
| *IdleInfoEUTRA* | The field is optionally present, Need OP, if the *IdleModeMobilityControlInfo* (i.e. without suffix) is included and includes *freqPriorityListEUTRA*; otherwise the field is not present. |
| *INACTIVE* | The field is mandatory present in this release. |
| *NoRedirect-r8* | The field is optionally present, Need OP, if the *redirectedCarrierInfo* (i.e. without suffix) is not included; otherwise the field is not present. |
| *Redirection* | The field is optionally present, Need ON, if the *redirectedCarrierInfo* is included and set to *geran*, *utra-FDD*, *utra-TDD* or *utra-TDD-r10*; otherwise the field is not present. |
| *UP-EDT* | The field is optionally present, Need ON, if the UE supports UP-EDT and *releaseCause* is set to *rrc-Suspend*; otherwise the field is not present. |

### 6.7.2 NB-IoT Message definitions

#### – *RRCConnectionRelease-NB*

The *RRCConnectionRelease-NB* message is used to command the release of an RRC connection, or to complete an UP-EDT procedure.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: E‑UTRAN to UE

*RRCConnectionRelease-NB* message

-- ASN1START

RRCConnectionRelease-NB ::= SEQUENCE {

rrc-TransactionIdentifier RRC-TransactionIdentifier,

criticalExtensions CHOICE {

c1 CHOICE {

rrcConnectionRelease-r13 RRCConnectionRelease-NB-r13-IEs,

spare1 NULL

},

criticalExtensionsFuture SEQUENCE {}

}

}

RRCConnectionRelease-NB-r13-IEs ::= SEQUENCE {

releaseCause-r13 ReleaseCause-NB-r13,

resumeIdentity-r13 ResumeIdentity-r13 OPTIONAL, -- Need OR

extendedWaitTime-r13 INTEGER (1..1800) OPTIONAL, -- Need ON

redirectedCarrierInfo-r13 RedirectedCarrierInfo-NB-r13 OPTIONAL, -- Need ON

lateNonCriticalExtension OCTET STRING OPTIONAL,

nonCriticalExtension RRCConnectionRelease-NB-v1430-IEs OPTIONAL

}

RRCConnectionRelease-NB-v1430-IEs ::= SEQUENCE {

redirectedCarrierInfo-v1430 RedirectedCarrierInfo-NB-v1430 OPTIONAL, -- Cond Redirection

extendedWaitTime-CPdata-r14 INTEGER (1..1800) OPTIONAL, -- Cond NoExtendedWaitTime

nonCriticalExtension RRCConnectionRelease-NB-v1530-IEs OPTIONAL

}

RRCConnectionRelease-NB-v1530-IEs ::= SEQUENCE {

drb-ContinueROHC-r15 ENUMERATED {true} OPTIONAL, -- Cond UP-EDT

nextHopChainingCount-r15 NextHopChainingCount OPTIONAL, -- Cond EarlySec

nonCriticalExtension RRCConnectionRelease-NB-v1550-IEs OPTIONAL

}

RRCConnectionRelease-NB-v1550-IEs ::= SEQUENCE {

redirectedCarrierInfo-v1550 RedirectedCarrierInfo-NB-v1550 OPTIONAL, -- Cond Redirection-TDD

nonCriticalExtension RRCConnectionRelease-NB-v15b0-IEs OPTIONAL

}

RRCConnectionRelease-NB-v15b0-IEs ::= SEQUENCE {

earlyRelease-r15 ENUMERATED {true} OPTIONAL, -- Need OP

nonCriticalExtension RRCConnectionRelease-NB-v1610-IEs OPTIONAL

}

RRCConnectionRelease-NB-v1610-IEs ::= SEQUENCE {

resumeIdentity-r16 I-RNTI-r15 OPTIONAL, -- Need OR

anr-MeasConfig-r16 ANR-MeasConfig-NB-r16 OPTIONAL, -- Need ON

pur-Config-r16 SetupRelease {PUR-Config-NB-r16}

OPTIONAL, -- Need ON

nonCriticalExtension SEQUENCE {} OPTIONAL

}

ReleaseCause-NB-r13 ::= ENUMERATED {loadBalancingTAUrequired, other,

rrc-Suspend, spare1}

RedirectedCarrierInfo-NB-r13::= CarrierFreq-NB-r13

RedirectedCarrierInfo-NB-v1430 ::= SEQUENCE {

redirectedCarrierOffsetDedicated-r14 ENUMERATED{

dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,

dB12, dB14, dB16, dB18, dB20, dB22, dB24, dB26},

t322-r14 ENUMERATED{

min5, min10, min20, min30, min60, min120, min180,

spare1}

}

RedirectedCarrierInfo-NB-v1550::= CarrierFreq-NB-v1550

-- ASN1STOP

| *RRCConnectionRelease-NB* field descriptions |
| --- |
| ***drb-ContinueROHC***  This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues when UE initiates UP-EDT in the same cell, while absence indicates that the header compression protocol context is reset. |
| ***earlyRelease***  Presence of the field indicates that the connection has been released without establishing the connection to the CN. |
| ***extendedWaitTime***  Value in seconds. |
| ***extendedWaitTime-CPdata***  Wait time for data transfer using the Control Plane CIoT EPS optimisation. Value in seconds. See TS 24.301 [35]. |
| ***redirectedCarrierInfo***  The r*edirectedCarrierInfo* indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to a NB-IoT carrier frequency, by means of the cell selection upon leaving RRC\_CONNECTED as specified in TS 36.304 [4]. |
| ***redirectedCarrierOffsetDedicated***  Parameter "Qoffsetdedicatedfrequency" in TS 36.304 [4]. For NB-IoT carrier frequencies, a UE that supports multi-band cells considers the *redirectedCarrierOffsetDedicated* to be common for all overlapping bands (i.e. regardless of the EARFCN that is used). |
| ***releaseCause***  The *releaseCause* is used to indicate the reason for releasing the RRC Connection.  E-UTRAN should not set the *releaseCause* to *loadBalancingTAURequired* if the *extendedWaitTime* is present and/or if the UE is connected to 5GC. |
| ***t322***  Timer T322 as described in clause 7.3. Value minN corresponds to N minutes. |

| Conditional presence | Explanation |
| --- | --- |
| *NoExtendedWaitTime* | The field is optionally present, Need ON, if the *extendedWaitTime* is not included; otherwise the field is not present. |
| *Redirection* | The field is optionally present, Need ON, if *redirectedCarrierInfo* is included; otherwise the field is not present. |
| *Redirection-TDD* | The field is optionally present, Need ON, if *redirectedCarrierInfo* is included in TDD mode. Otherwise, the field is not present. |
| *UP-EDT* | The field is optionally present, Need ON, if the UE supports UP-EDT or UP transmission using PUR and *releaseCause* is set to *rrc-Suspend*; otherwise the field is not present. |
| *EarlySec* | For EPC, the field is optionally present, Need ON, if the UE supports early security reactivation or UP-EDT or UP transmission using PUR and *releaseCause* is set to *rrc-Suspend*; otherwise the field is not present.  For 5GC, the field is mandatory present if *releaseCause* is set to *rrc-Suspend*; otherwise the field is not present. |