**3GPP TSG-RAN WG2 Meeting #110-eDraftR2-2005925**

**01-12 June 2020, online**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.306** | **CR** | **1746** | **rev** | **3** | **Current version:** | **16.0.0** |  |
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| *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:*** | Updates for Rel-16 additional enhancements NB-IoT | | | | | | | | | |
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| ***Source to WG:*** | BlackBerry | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NB-IOTenh3-Core | | | | |  | ***Date:*** | | | 2020-06-11 |
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| ***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 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:*** | | This CR captures the agreements for NB-IoT Rel-16 at RAN2-109-e, RAN2-109bis-e and RAN2-110e. | | | | | | | | |
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| ***Summary of change:*** | | The following agreements have been captured in this CR:  RAN2-109-e:  Scheduling Multiple DL/UL Transport Blocks (common with MTC):  - For NB-IoT, support of multiTB-UL-r16 and multiTB-DL-r16 is conditional on support of two HARQ processes.  - For LTE-M and NB-IoT, multiple TBs scheduling in multicast is optional without capability reporting.  In addition, in the RRC NB-IoT CR, the following additional capabilties have been captured:  *multiTB-DL-Interleaving, multiTB-UL-Interleaving*  Defines whether the UE supports interleaved transmission when multiple TBs is scheduled in RRC\_CONNECTED for DL and UL respectively.  If *multiTB-DL-Interleaving* or *multiTB-UL-Interleaving* is included, the UE shall also indicate support for *multiTB-DL* or *multiTB-UL* respectively  *multiTB-HARQ-AckBundling*  Defines whether the UE supports HARQ ACK bundling for interleaved transmission for DL.  If *multiTB-HARQ-AckBundling* is included, the UE shall also indicate support for *multiTB-DL-Interleaving*.  It is suggested to align for now TS 36.306 with the above. This can be revisited if necessary when the UE Features list is received from RAN1.  Connection to 5GC (common with MTC):  - RRC Connection re-establishment for the control plane for NB-IoT UEs connected to 5GC is optional, without capability reporting (NB-IoT only).(From RAN2-108).  - The existing capability multipleDRB-r13 is also applicable to 5GC (NB-IoT only).  - DL channel quality report can be supported for both NB-IoT and eMTC connected to 5GC. [No impact as CN type not mentioned means that in general the capability applies to both].  - PUR is supported in EPC and 5GC.  - Introduce separate UE capabilities pur-UP-5GC-r16 and pur-CP-5GC-r16.  UE-group wake-up signal (WUS) (common with MTC):  - Support of Release 16 WUS is independent to support of Release 15 WUS.  Network management tool enhancement:  - RACH report is not applicable to 5GC. - RLF report is not applicable to 5GC. - Support of RACH report is optional with capability reporting. - Support of RLF report is optional at the UE without capability reporting.  Coexistence with NR:  - Working assumption: Introduce two UE capabilities for handling resources reservation on DL or UL in PhyLayerParameters-NB-v16xy.  - Working assumption: Two UE capabilities for handling resources reservation on DL or UL in PhyLayerParameters-NB-v16xy can be applied to both FDD and TDD, e.g., with separate values for FDD or TDD.  - Working assumption: Two UE capabilities for handling resources reservation on DL or UL can be introduced into TS 36.306, e.g., section 4.3.4.  RAN2-109bis-e:  GWUS:  Confirm the working assumption: “Support of Release 16 WUS is independent to support of Release 15 WUS”.  1-1: For NB-IoT and eMTC, the existing capability *wakeUpSignalMinGap-eDRX-r15* also applies to Rel-16 WUS.  1-2: For NB-IoT, Rel-16 GWUS is only applicable to FDD.  1-3: For eMTC, separate capability indications are introduced for FDD and TDD.  1-4: For NB-IoT and eMTC, Rel-16 GWUS is applicable to both EPC and 5GC, and there is no need for capability differentiation.  Multi-TB scheduling  2-1: For NB-IoT, multiple TB scheduling in unicast and in multicast is only applicable to FDD.  2-2: For NB-IoT and eMTC, multiple TB scheduling in unicast is applicable to both EPC and 5GC without differentiation.  2-3: For NB-IoT and eMTC, multiple TB scheduling in multicast is only applicable to EPC.  SON  3-1: For NB-IoT, support of ANR, RACH report and RLF report are applicable to both FDD and TDD and there is no need for FDD/TDD differentiation.  DL channel quality reporting in MSG3  4-1: For NB-IoT, move the featureDL channel quality reporting in MSG3 for non-anchor carrier to section 6.17.  4-2’: DL channel quality reporting in Msg3 for NB-IoT anchor carrier and DL channel quality reporting in Msg3 for eMTC are two separate optional features.  4-3’: For NB-IoT, update the description of the legacy featureDL channel quality reporting in MSG3 (6.17.2) to reflect that it applies to the anchor carrier.  4-4: For NB-IoT, DL channel quality reporting in MSG3 for non-anchor carrier is only applicable to FDD.  4-5: For NB-IoT and eMTC, DL channel quality reporting in MSG3 is applicable to both EPC and 5GC without capability differentiation.  DL channel quality reporting in connected mode  5-1: Keep a common capability for NB-IoT and eMTC for DL channel quality reporting in connected mode and clarify in the description that reporting of the serving cell applies to E-UTRAN and reporting of the configured carrier applies to NB-IoT.  5-2: For NB-IoT, DL channel quality reporting in connected mode is only applicable to FDD. For eMTC, it is applicable to both FDD and TDD.  5-3: For NB-IoT and eMTC, DL channel quality reporting in connected mode is applicable to both EPC and 5GC without capability differentiation.  NRS presence on non-anchor carrier  6-1: For NB-IoT, Idle mode RRM measurements on non–anchor paging carrier is only applicable to FDD.  6-2: For NB-IoT, Idle mode RRM measurement on non–anchor carrier is applicable to EPC and 5GC without capability differentiation.  Co-existence with NR  8-1: For NB-IoT and eMTC, UL andDL resource reservation for coexistence with NR are applicable to EPC and 5GC without capability differentiation.  Connection to 5GC  9-1: For NB-IoT, introduce a new optional feature, NB-IoT/5GC, in section 6.18.  9-2: For NB-IoT and eMTC, remove the capabilities introduced in 6.18.1 (User Plane CIoT 5GS optimisations) and 6.18.2 (Control Plane CIoT 5GS optimisations).  9-3: For NB-IoT and eMTC, introduce a new optional feature, MO-EDT for Control Plane CIoT 5GS Optimisation, in section 6.18 and remove the editor’s note in 6.8.4.  9-4’: For NB-IoT, all pre-Rel15 capabilities not CIoT EPS optimisations related and other than *rai-Support-r14* are applicable to 5GC without capability differentiation. FFS *rai-Support-r14.*  (No change to the description for 9-4’).  RAN2-110e:  Email agreement [306]:  Assistance information for inter-RAT cell selection to/from NB-IoT:  1-1:For NB-IoT**,** introduce an optional feature for support of assistance information for inter-RAT cell selection to/from NB-IoT in TS 36.306.  AS RAI enhancement for UE connected to 5GC:  2-1:For NB-IoT and eMTC**,** *rai-Support-r14* applies to both EPC and 5GC without EPC/5GC differentiation. (no impact).  2-2:For NB-IoT and eMTC, introduce an optional feature for support of AS RAI enhancement for UE connected to 5GC in TS 36.306.  Group Wake Up Signal:  3-1: For NB-IoT and eMTC, for FDD, clarify in TS 36.331 and TS 36.306 that the capability *groupWakeUpSignal-r16* corresponds to GWUS without group alternation.  3-2: For NB-IoT and eMTC, for FDD, introduce a new capability *groupWakeUpSignalAlternation-r16* corresponding to GWUS with group alternation, conditional to support of *groupWakeUpSignal-r16*.  PUR:  4-1a:For NB-IoT FDD introduce a new capability *pur-NRSRP-Validation-r16*, conditional to support of at least one of the following capabilities: *pur-CP-EPC-r16, pur-CP-5GC-r16, pur-UP-EPC-r16* or *pur-UP-5GC-r16.*  4-2:For NB-IoT FDD and eMTC, introduce a new capability *pur-CP-L1Ack-r16.* For NB-IoT, conditional to support of at least one of the following capabilities: *pur-CP-EPC-r16, pur-CP-5GC-r16. For eMTC, conditional to support of at least one of the capabilities: pur-CP-EPC-CE-ModeA-r16, pur-CP-5GC-CE-ModeA-r16.* [Check Brian CR]  MultiTB scheduling:  5-1: For NB-IoT FDD, change the capability names in TS 36.306 to *npdsch-MultiTB-r16,* *npdsch-MultiTB-Interleaving-r16, npusch-MultiTB-r16* and *npusch-MultiTB-Interleaving-r16.*  5-2:For NB-IoT FDD, remove the conditions in TS 36.331 and TS 36.306 that a UE that supports *npdsch-MultiTB-Interleaving-r16* (*npusch-MultiTB-Interleaving-r16)* shall also support general *npdsch-MultiTB-r16* (*npusch-MultiTB-r16).*  Resource reservation for NR:  6-1:For NB-IoT FDD and TDD, rename the two already defined capabilities to *subframeResourceResvUL-r16* and *subframeResourceResvDL-r16*.  6-2: For NB-IoT FDD and TDD, introduce two new physical layer capabilities *slotSymbolResourceResvUL-r16* and *slotSymbolResourceResvDL-r16*, conditional to support of *subframeResourceResvUL-r16* and *subframeResourceResvDL-r16* respectively.  NRS presence on non-anchor carrier:  7-1: For NB-IoT FDD, introduce a new optional feature “NRS presence on non-anchor paging carriers” in TS 36.306.  7-2: For NB-IoT FDD, clarify in the description of the already agreed optional feature “RRM measurements on non-anchor paging carriers” that it is dependent on support of ‘NRS presence on non-anchor paging carriers”.  Email agreement [409]:  1: For eMTC and NB-IoT, Move the four PUR capabilities to a new capability group “PUR-Parameters” and create a new subclause in 36.306 4.3.x.  2: Change the group Wake Up Signal capabilities names in the eMTC correction CR so the names align with NB-IoT and Rel-15 capabilities names.  3: For eMTC, introduce PUR capabilities for CE Mode A and CE Mode B separately. | | | | | | | | |
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| ***Consequences if not approved:*** | | WI cannot be completed. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.3, 4, 4.3.4.182, 4.3.4.183, 4.3.4.a1 (new), 4.3.4.a2 (new), 4.3.4.a3 (new), 4.3.4.a4 (new), 4.3.4.a5 (new), 4.3.4.a6 (new), 4.3.4.a7 (new), 4.3.4.a8 (new), 4.3.4.a9 (new), 4.3.4.114, 4.3.8.5, 4.3.12.c (new), 4.3.19.22, 4.3.x (new), 4.3.x.1 (new), 4.3.x.2 (new), 4.3.x.3 (new), 4.3.x.4 (new), 4.3.x.5 (new), 4.3.x.6 (new), 6.7.6, 6.8.4, 6.10.d (new), 6.16.e (new), 6.17.2, 6.17.f (new), 6.17.g (new), 6.17.h (new), 6.18.1, 6.18.2, 6.18.g (new), 6.18.h (new), 6.18.i (new), 6.18.j (new), | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS 36.331 CR 4287 | | |
| ***affected:*** | |  |  | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

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| First change |

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

1xRTT CDMA2000 1x Radio Transmission Technology

ACK Acknowledgement

ACDC Application specific Congestion control for Data Communication

ANDSF Access Network Discovery and Selection Function

ANR Automatic Neighbour Relation

BCCH Broadcast Control Channel

CAS Cell Acquisition Subframes

CFI Control Format Indicator

CG Cell Group

CRS Cell-specific Rerefence Signal

CSG Closed Subscriber Group

CSI Channel State Information

DC Dual Connectivity

DCI Downlink Control Information

DL-SCH Downlink Shared Channel

E-UTRA Evolved Universal Terrestrial Radio Access

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDD Frequency Division Duplex

GERAN GSM/EDGE Radio Access Network

HARQ Hybrid Automatic Repeat Request

HRPD High Rate Packet Data

IRC Interference Rejection Combining

MAC Medium Access Control

MMSE Minimum Mean Squared Error

MO-EDT Mobile Originated Early Data Transmission

MRO Mobility Robustness Optimisation

MT-EDT Mobile Terminated Early Data Transmission

MTSI Multimedia Telephony Service for IMS

MUST MultiUser Superposition Transmission

NAICS Network Assisted Interference Cancellation/Suppression

NB-IoT Narrow Band Internet of Things

OS OFDM Symbol

PCell Primary Cell

PDCCH Physical Downlink Control Channel

PDCP Packet Data Convergence Protocol

PDSCH Physical Downlink Shared Channel

PHR Power Headroom Reporting

ProSe Proximity-based Services

PUCCH Physical Uplink Control Channel

PUR Preconfigured Uplink Resource

PUSCH Physical Uplink Shared Channel

QoE Quality of Experience

RACH Random Access CHannel

RAI Release Assistance Indication

RAT Radio Access Technology

RLC Radio Link Control

RLF Radio Link Failure

ROHC RObust Header Compression

RRC Radio Resource Control

SC-PTM Single Cell Point to Multipoint

SCC Secondary Component Carrier

SCell Secondary Cell

SI System Information

SL Sidelink

SL-DCH Sidelink Discovery CHannel

SL-SCH Sidelink Shared CHannel

SON Self Organizing Networks

SPT Short Processing Time

SR Scheduling Request

SSAC Service Specific Access Control

SSTD SFN and Subframe Timing Difference

STTI Short TTI

TDD Time Division Duplex

TTI Transmission Time Interval

UCI Uplink Control Information

UDC Uplink Data Compression

UE User Equipment

UL-SCH Uplink Shared Channel

UMTS Universal Mobile Telecommunications System

UTRA UMTS Terrestrial Radio Access

V2X Vehicle-to-Everything

WLAN Wireless Local Area Network

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| Next changes |

# 4 UE radio access capability parameters

The following clauses define the UE radio access capability parameters and minimum capabilities for MBMS capable UE. Only parameters for which there is the possibility for UEs to signal different values are considered as UE radio access capability parameters. Therefore, mandatory features without capability parameters that are the same for all UEs are not listed here. Also capabilities which are optional or conditionally mandatory for UEs to implement but do not have UE radio access capability parameter are listed in this specification.

E-UTRAN needs to respect the signalled UE radio access capability parameters when configuring the UE and when scheduling the UE.

All parameters shown in italics are signalled and correspond to a field defined in TS 36.331 [5].

For optional features, the UE radio access capability parameter indicates whether the feature has been implemented and successfully tested. For mandatory features with the UE radio access capability parameter, the parameter indicates whether the feature has been successfully tested.

The mandatory features required to be supported by a UE are the same for all UE categories unless explicitly specified elsewhere in the specifications.

Unless otherwise stated, the requirements on the maximum number of transport block bits are applicable for a TTI length of 1 ms. For other TTI lengths, the requirements shall be scaled according to clause 7.1.7 in TS 36.213 [22] in order to get the corresponding requirement.

The following UE radio access capability parameters specified in Chapter 4 are applicable in NB-IoT:

- *ue-Category-NB* in NB-IoT (clause 4.1C)

- *supportedROHC-Profiles-r13* (clause 4.3.1.1A)

- *maxNumberROHC-ContextSessions-r13* (clause 4.3.1.2A)

- *rlc-UM-r15 (*clause *4.3.2.5)*

- *multiTone-r13* (clause 4.3.4.55)

- *multiCarrier-r13* (clause 4.3.4.56)

- *twoHARQ-Processes-r14* (clause 4.3.4.62)

- *multiCarrier-NPRACH-r14* (clause 4.3.4.75)

- *multiCarrierPaging-r14* (clause 4.3.4.76)

- *interferenceRandomisation-r14* (clause 4.3.4.80)

- *wakeUpSignal-r15* (clause 4.3.4.113)

- *wakeUpSignalMinGap-eDRX-r15* (clause 4.3.4.114)

- *mixedOperationMode-r15* (clause 4.3.4.115)

- *sr-WithHARQ-ACK-r15* (clause 4.3.4.117)

- *sr-WithoutHARQ-ACK-r15* (clause 4.3.4.118)

- *nprach-Format2-r15* (clause 4.3.4.119)

- *multiCarrierPagingTDD-r15* (clause 4.3.4.134)

- *additionalTransmissionSIB1-r15* (clause 4.3.4.137)

- *npusch-3dot75kHz-SCS-TDD-r15* (clause 4.3.4.177)

- *npusch-MultiTB-r16* (clause 4.3.4.182)

- *npdsch-MultiTB-r16* (clause 4.3.4.183)

- *npusch-MultiTB-Interleaving-r16* (clause 4.3.4.a1)

- *npdsch-MultiTB-Interleaving-r16* (clause 4.3.4.a2)

- *multiTB-HARQ-AckBundling-r16* (clause 4.3.4.a3)

- *groupWakeUpSignal-r16* (clause 4.3.4.a4)

- *groupWakeUpSignalAlternation-r16* (clause 4.3.4.a5)

- *subframeResourceResvUL-r16* (clause 4.3.4.a6)

- *subframeResourceResvDL-r16* (clause 4.3.4.a7)

- *slotSymbolResourceResvUL-r16* (clause 4.3.4.a8)

- *slotSymbolResourceResvDL-r16* (clause 4.3.4.a9)

- *supportedBandList-r13* (clause 4.3.5.1A)

- *multiNS-Pmax-r13* (clause 4.3.5.16A)

- *powerClassNB-20dBm-r13* (clause 4.3.5.1A.1)

- *powerClassNB-14dBm-r14* (clause 4.3.5.1A.2)

- *dl*-*ChannelQualityReporting-r16* (clause 4.3.6.37)

- *accessStratumRelease-r13* (clause 4.3.8.1A)

- *multipleDRB-r13* (clause 4.3.8.5)

- *earlyData-UP-r15* (clause 4.3.8.7)

- *earlySecurityReactivation-r16* (clause 4.3.8.11)

- *anr-Report-r16* (clause 4.3.12.2)

- *rach-Report-r16* (clause 4.3.12.c)

- *logicalChannelSR-ProhibitTimer* (clause 4.3.19.2)

- *dataInactMon-r14* (clause 4.3.19.9)

- *rai-Support-r14* (clause 4.3.19.10)

- *earlyContentionResolution-r14* (clause 4.3.19.14)

- *sr-SPS-BSR-r15* (clause 4.3.19.15)

- *rai-SupportEnh-r16* (clause 4.3.19.22)

- *earlyData-UP-5GC-r16* (clause 4.3.36.9)

- *pur-CP-EPC-r16* (clause 4.3.x.1)

- *pur-UP-EPC-r16* (clause 4.3.x.2)

- *pur-CP-5GC-r16* (clause 4.3.x.3)

- *pur-UP-5GC-r16* (clause 4.3.x.4)

- *pur-CP-L1Ack-r16* (clause 4.3.x.5)

- *pur-NRSRP-Validation-r16* (clause 4.3.x.6)

The UE radio access capabilities specified in Chapter 4 are not applicable in NB-IoT, unless they are listed above.

The following optional features without UE radio access capability parameters specified in Chapter 6 are applicable in NB-IoT:

- RRC Connection Re-establishment for the Control Plane CIoT EPS Optimization (clause 6.7.5)

- System Information Block Type 16 (clause 6.8.1)

- Enhanced random access power control (clause 6.8.3)

- MT-EDT for Control Plane CIoT EPS Optimisation (clause 6.8.10)

- MT-EDT for User Plane CIoT EPS Optimisation (clause 6.8.11)

- EDT for Control Plane CIoT EPS Optimization (clause 6.8.4)

- Enhanced PHR (clause 6.8.6)

- Radio Link Failure Report for NB-IoT (clause 6.10.d)

- SC-PTM in Idle mode (clause 6.16.1)

- Multiple TB scheduling for multicast (clause 6.16.e)

- Relaxed monitoring (clause 6.17.1)

- DL channel quality reporting in Msg3 for the anchor carrier (clause 6.17.2)

- Serving cell idle mode measurements reporting (clause 6.17.3)

- NSSS-Based RRM measurements (clause 6.17.4)

- NPBCH-Based RRM measurements (clause 6.17.5)

- RRM measurements on non-anchor paging carriers (clause 6.17.6)

- DL channel quality reporting in MSG3 for non-anchor carrier (clause 6.17.f)

- NRS presence on non-anchor paging carriers (clause 6.17.g)

- Assistance information for inter-RAT cell selection to/from NB-IoT (clause 6.17.h)

- User Plane CIoT 5GS optimisations (clause 6.18.1)

- RRC Connection Re-establishment for the Control Plane CIoT 5GS Optimisation (clause 6.18.g)

- EUTRA/5GC for NB-IoT (clause 6.18.h)

- MO-EDT for Control Plane CIoT 5GS Optimisation (clause 6.18.i)

- AS RAI (clause 6.18.j)

The optional features without UE radio access capability parameters specified in Chapter 6 are not applicable in NB-IoT, unless they are listed above.

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| Next changes |

#### 4.3.4.114 *wakeUpSignalMinGap-eDRX-r15*

This field indicates the minimum gap required between end of WUS and start of PO by a UE indicating support of extended idle mode DRX for FDD, as specified in TS 24.301 [28]. A UE indicating support of *wakeUpSignalMinGap-eDRX-r15* shall also indicate support of w*akeUpSignal-r15* or *groupWakeUpSignal-r16*. This feature is only applicable if the UE supports *ce-ModeA-r13* or if the UE supports any *ue-Category-NB*.

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#### 4.3.4.182 *npusch-MultiTB-r16*

This field indicates whether the UE supports multiple TB scheduling in the uplink for FDD as specified in TS 36.213 [22]. A UE indicating support of *npusch-MultiTB-r16* shall also indicate support of *twoHARQ-Processes-r14*.

#### 4.3.4.183 *npdsch-MultiTB-r16*

This field indicates whether the UE supports multiple TB scheduling in the downlink for FDD as specified in TS 36.213 [22]. A UE indicating support of *npdsch-MultiTB-r16* shall also indicate support of *twoHARQ-Processes-r14*.

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#### 4.3.4.a1 *npusch-MultiTB-Interleaving-r16*

This field indicates whether the UE supports interleaved transmissions when multiple TB scheduling is scheduled in the uplink for NB-IoT FDD as specified in TS 36.213 [22]. A UE indicating support of *npusch-MultiTB-Interleaving-r16* shall also indicate support of *twoHARQ-Processes-r14.* .

#### 4.3.4.a2 *npdsch-MultiTB-Interleaving-r16*

This field indicates whether the UE supports interleaved transmissions when multiple TB scheduling is scheduled in the downlink for NB-IoT FDD as specified in TS 36.213 [22]. A UE indicating support of *npdsch-MultiTB-Interleaving-r16* shall also indicate support of *twoHARQ-Processes-r14.* .

#### 4.3.4.a3 *multiTB-HARQ-AckBundling-r16*

This field indicates whether the UE supports HARQ ACK bundling for interleaved transmission in the downlink for NB-IoT FDD as specified in TS 36.213 [22]. A UE indicating support of *multiTB-HARQ-AckBundling-r16* shall also indicate support of *npdsch-multiTB-Interleaving-r16*.

4.3.4.a4 *groupWakeUpSignal-r16*

This field indicates whether the UE supports Group WUS without group resource alternation for FDD in RRC\_IDLE as specified in TS 36.211 [17], TS 36.213 [22] and TS 36.304 [14]. A UE indicating support of *groupWakeUpSignal-r16* shall also indicate support of *ce-ModeA-r13* or any *ue-Category-NB*.

4.3.4.a5 *groupWakeUpSignalAlternation-r16*

This field indicates whether the UE supports Group WUS with group resource alternation for FDD in RRC\_IDLE as specified in TS 36.211 [17], TS 36.213 [22] and TS 36.304 [14]. A UE indicating support of *groupWakeUpSignalAlternation-r16* shall also indicate support of *groupWakeUpSignal-r16*.

4.3.4.a6 *subframeResourceResvUL-r16*

This field indicates whether the UE supports UL resource reservation with subframe-level granularity on non-anchor carriers e.g. for NB-IoT coexistence with NR, as specified in TS 36.211 [17].

4.3.4.a7 *subframeResourceResvDL-r16*

This field indicates whether the UE supports DL resource reservation with subframe-level granularity on non-anchor carriers e.g. for NB-IoT coexistence with NR, as specified in TS 36.211 [17].

4.3.4.a8 *slotSymbolResourceResvUL-r16*

This field indicates whether the UE supports UL resource reservation with slot-level granularity on non-anchor carriers e.g. for NB-IoT coexistence with NR, as specified in TS 36.211[17].A UE indicating support of *slotSymbolResourceResvUL-r16* shall also indicate support of *subframeResourceResvUL-r16.*

4.3.4.a9 *slotSymbolResourceResvDL-r16*

This field indicates whether the UE supports DL resource reservation with slot-level granularity on non-anchor carriers e.g. for NB-IoT coexistence with NR, as specified in TS 36.211[17].A UE indicating support of *slotSymbolResourceResvDL-r16* shall also indicate support of *subframeResourceResvDL-r16.*

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| Next changes |

#### 4.3.6.37 *ce-DL-ChannelQualityReporting-r16*

This field indicates whether the UE supports DL channel quality reporting of the serving cell when the UE is operating in coverage enhancement mode A or B in RRC\_CONNECTED as specified in TS 36.331 [5]. A UE indicating support of *ce-DL-ChannelQualityReporting-r16* shall also indicate support of *ce-ModeA-r13*.

#### 4.3.6.37a *dl-ChannelQualityReporting-r16*

This field indicates whether the UE supports DL channel quality reporting of the configured carrier for NB-IoT FDD, in RRC\_CONNECTED as specified in TS 36.331 [5]. A UE indicating support of *DL-ChannelQualityReporting-r16* shall also indicate support of any *ue-Category-NB*.

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| Next changes |

#### 4.3.8.5 *multipleDRB-r13*

This field indicates whether the UE supports multiple DRBs. This field is only applicable if the UE supports S1-U data transfer or User plane CIoT EPS Optimisation as defined in TS[28] or NG-U data transfer or User plane CIoT 5GS Optimisation as defined in TS 24.501 [39], and any *ue-Category-NB*. If a UE of this release supports multiple DRBs, the UE shall support two simultaneous DRBs.

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| Next changes |

#### 4.3.8.12 Void

#### 4.3.8.13 Void

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| Next changes |

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| Next changes |

#### 4.3.12.2 *anr-Report-r16*

This field indicates whether the UE supports ANR measurement configuration and reporting in RRC\_IDLE as specified in TS 36.304 [14] and TS 36.331 [5]. This feature is only applicable if the UE supports any *ue-Category-NB*.

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| Next changes |

#### 4.3.12.c *rach-Report-r16*

This field indicates whether the UE supports delivery of *rachReport* upon request from the network as specified in TS 36.331 [5] when connected to EPC. This feature is only applicable if the UE supports any *ue-Category-NB*.

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| Next changes |

4.3.19.22 *rai-SupportEnh-r16*

This field indicates whether the UE supports AS Release Assistance Indication (AS RAI) in Downlink Channel Quality Report and AS RAI MAC Control Element as specified in TS 36.321 [4] when connected to EPC. A UE indicating support of *rai-SupportEnh-r16* shall also indicate support of *ce-ModeA-r13* or any *ue-Category-NB*.

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| Next changes |

### 4.3.x PUR parameters

#### 4.3.x.1 *pur-CP-EPC-r16*

This field indicates whether the UE supports transmission in preconfigured UL resource (PUR) for NB-IoT FDD for Control Plane CIoT EPS optimisation, as defined in TS 36.300 [30].

#### 4.3.x.2 *pur-UP-EPC-r16*

This field indicates whether the UE supports transmission in preconfigured UL resource (PUR) for NB-IoT FDD for User Plane CIoT EPS optimisation, as defined in TS 36.300 [30].

4.3.x.3 *pur-CP-5GC-r16*

This field indicates whether the UE supports transmission in preconfigured UL resource (PUR) for NB-IoT FDD for Control Plane CIoT 5GS optimisation as specified TS 36.300 [30].

4.3.x.4 *pur-UP-5GC-r16*

This field indicates whether the UE supports transmission in preconfigured UL resource (PUR) for NB-IoT FDD for User Plane CIoT 5GS optimisation as specified TS 36.300 [30].

#### 4.3.x.5 *pur-CP-L1Ack-r16*

This field indicates whether the UE supports PUR Layer1 acknowledgement as specified in TS 36.213 [22]. A UE indicating support of *pur-CP-L1Ack-r16* shall also indicate support of *pur-CP-EPC-r16*or *pur-CP-5GC-r16* or *pur-CP-EPC-CE-ModeA-r16* or *pur-CP-5GC-CE-ModeA-r16*.

#### 4.3.x.6 *pur-NRSRP-Validation-r16*

This field indicates whether the UE supports NRSRP validation for FDD as specified in TS 36.304 [14] and TS 36.331 [5]. A UE indicating support of *pur-NRSRP-Validation-r16* shall also indicate support of *pur-CP-EPC-r16 or pur-CP-5GC-r16 or pur-UP-EPC-r16* or *pur-UP-5GC-r16*.

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| Next changes |

### 6.7.6 Void

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| Next changes |

### 6.8.4 MO-EDT for Control Plane CIoT EPS Optimization

It is optional for UE to support MO-EDT for Control Plane CIoT EPS optimizations as specified in TS 24.301 [28]. This feature is only applicable if the UE supports *ce-ModeA-r13*, or for FDD if the UE supports any *ue-Category-NB*.

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| Next changes |

## 6.10 SON features

### 6.10.1 Radio Link Failure Report for inter-RAT MRO

It is optional for UE to include *previousUTRA-CellId* and *selectedUTRA-CellId* in *RLF-Report* upon request from the network as specified in TS 36.331 [5].

### 6.10.d Radio Link Failure Report for NB-IoT

It is optional for UE to support the storage of *RLF-Report* and the reporting in *UEInformationResponse* message as specified in TS 36.331 [5] when connected to EPC.

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| Next changes |

## 6.16 SC-PTM features

### 6.16.1 SC-PTM in Idle mode

It is optional for UE to support the SC-PTM reception in RRC\_IDLE as specified in TS 36.331 [5]. This feature is only applicable if the UE supports UE category M1 or UE category M2 or if the UE supports coverage enhancements (*ce-ModeB-r13* and/or *ce-ModeA-r13*) or for FDD, if the UE supports any *ue-Category-NB*.

6.16.e Multiple TB scheduling for SC-PTM in Idle mode

It is optional for UE to support multiple TB scheduling for multicast as specified in TS 36.331 [5] when connected to EPC. This feature is only applicable if the UE supports *ce-ModeA-r13,* or for FDD if the UE supports any *ue-Category-NB*.

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| Next changes |

### 6.17.2 DL channel quality reporting in Msg3 for the anchor carrier

It is optional for UE to support DL channel quality reporting in Msg3 for the anchor carrier for FDD as specified in TS 36.331 [5]..

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| Next changes |

### 6.17.6 RRM measurements on non-anchor paging carriers

It is optional for UE to support idle mode RRM measurements on non-anchor paging carriers for FDD as specified in TS 36.133 [6]. A UE supporting RRM measurements on non-anchor paging carriers shall also support NRS presence on non-anchor paging carriers.

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| Next changes |

### 6.17.f NRS presence on non-anchor paging carriers

It is optional for UE to support NRS presence on non-anchor paging carriers for FDD as specified in TS 36.2111 [5].

### 6.17.g DL channel quality reporting in MSG3 for non-anchor carrier

It is optional for UE to support DL channel quality reporting for a non-anchor carrier for FDD in MSG3 as specified in TS 36.331 [5].

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| Next changes |

### 6.17.h Assistance information for inter-RAT cell selection to/from NB-IoT

It is optional for UE to support assistance information for inter-RAT cell selection to/from NB-IoT as specified in TS 36.331 [5].

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| Next changes |

## 6.18 E-UTRA/5GC features

### 6.18.1 Void

### 6.18.2 Void

### 6.18.g RRC Connection Re-establishment for the Control Plane CIoT 5GS Optimisation

It is optional for UE to support *RRCConnectionReestablishment* for the Control Plane CIoT 5GS Optimisation as specified in TS 36.331 [5]. A UE supporting *RRCConnectionReestablishment* for the Control Plane CIoT 5GS Optimisation shall also support EUTRA/5GC for NB-IoT.

### 6.18.h EUTRA/5GC for NB-IoT

It is optional for UE to support EUTRA/5GC for NB-IoT.

### 6.18.i MO-EDT for Control Plane CIoT 5GS Optimisation

It is optional for UE to support MO-EDT for Control Plane CIoT 5GS optimisations as specified in TS 24.501 [39]. A UE supporting MO-EDT for the Control Plane CIoT 5GS Optimisation shall also support EUTRA/5GC for NB-IoT or indicate support of *eutra-5GC-CE-r15*.

### 6.18.j AS RAI

It is optional for UE to support AS Release Assistance Indication (AS RAI) in Downlink Channel Quality Report and AS RAI MAC Control Element as specified in TS 36.321 [4] when connected to 5GC. A UE supporting AS RAI shall also support EUTRA/5GC for NB-IoT or indicate support of *eutra-5GC-CE-r15*.