**3GPP TSG-WG2 Meeting #119-e *draft-R2-2208789***

**Online, 15 August – 29 August 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **36.306** | **CR** | **1855** | **rev** | **1** | **Current version:** | **17.1.0** |  |
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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:***  | UE capabilities correction for IoT-NTN |
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| ***Source to WG:*** | Nokia, Nokia Shangai Bell |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | LTE\_NBIOT\_eMTC\_NTN |  | ***Date:*** | 2022-08-10 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | To capture the proposals of RAN2 e-mail discussion [230] related to UE capabilities for IoT-NTN.Proposals :.P1 :New parameter ntn-NeedSegmentedPrecompensationGaps-r17 is introduced with below description.* This field indicates the supported gap length between segments for PUSCH and PUCCH required by an UE supporting ce-ModeA-r13 or by UE supporting UE-category-NB for TA pre-compensation.
* This feature is only applicable if the UE supports either UE-category-NB or ce-ModeA-r13 and also supports *ntn-Connectivity-EPC-r17*.
* If a UE does not include this field but includes *ntn-Connectivity-EPC-r17*, in case of overlapped transmission between successive uplink segments, UE shall follow the procedure specified in TS36.213.”

P3: [Modify the description of standalone GNSS-Location to include eMTC-NTN use.](#_Toc111016905)[P4:Clarify if GNSS capability for NB-IoT is implicit with the indication of ntn-Connectivity-EPC-r17.](#_Toc111016906) |
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| ***Summary of change:*** | * New parameter for GapLength is introduced as given in the proposal.
* GNSS capability description is clarified to include applicability for NTN.
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| ***Consequences if not approved:*** | New capability for precompensation gaps not supported. GNSS functionality for IoT-NTN is not clear from the UE capability perspective. |
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| ***Clauses affected:*** | 4,4.3.13, 4.3.38.X (New) |
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|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.331 CR 4832TS 36.213 CR XXXX |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| Beginning of change |

# 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 or 11.1 in TS 36.213 [22] in order to get the corresponding requirement.

The following UE radio access capability parameters specified in clause 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 4.3.4.192)

- *npdsch-MultiTB-Interleaving-r16* (clause 4.3.4.193)

- *multiTB-HARQ-AckBundling-r16* (clause 4.3.4.194)

- *groupWakeUpSignal-r16* (clause 4.3.4.195)

- *groupWakeUpSignalAlternation-r16* (clause 4.3.4.196)

- *subframeResourceResvUL-r16* (clause 4.3.4.197)

- *subframeResourceResvDL-r16* (clause 4.3.4.198)

- *slotSymbolResourceResvUL-r16* (clause 4.3.4.199)

- *slotSymbolResourceResvDL-r16* (clause 4.3.4.200)

- *npdsch-16QAM-r17* (clause 4.3.4.222)

- *npusch-16QAM-r17* (clause 4.3.4.223)

- *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)

- *connModeMeasIntraFreq-r17* (clause 4.3.6.49)

- *connModeMeasInterFreq-r17* (clause 4.3.6.50)

- *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)

- *coverageBasedPaging-r17* (clause 4.3.8.16)

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

- *rach-Report-r16* (clause 4.3.12.3)

- *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 4.3.37.1)

- *pur-UP-EPC-r16* (clause 4.3.37.2)

- *pur-CP-5GC-r16* (clause 4.3.37.3)

- *pur-UP-5GC-r16* (clause 4.3.37.4)

- *pur-CP-L1Ack-r16* (clause 4.3.37.5)

- *pur-NRSRP-Validation-r16* (clause 4.3.37.6)

- *ntn-Connectivity-EPC-r17* (clause 4.3.38.1)

- *ntn-TA-Report-r17* (clause 4.3.38.2)

- *ntn-PUR-TimerDelay-r17* (clause 4.3.38.3)

*-* *ntn-OffsetTimingEnh-r17* (clause 4.3.38.4)

*-* *ntn-ScenarioSupport-r17* (clause 4.3.38.5)

*- ntn-SegmentedPrecompensationGaps-r17* (clause 4.3.38.X)

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

The following optional features without UE radio access capability parameters specified in clause 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)

- Carrier specific NRSRP thresholds for NPRACH resource selection (clause 6.8.15)

- Radio Link Failure Report for NB-IoT (clause 6.10.2)

- SC-PTM in Idle mode (clause 6.16.1)

- Multiple TB scheduling for SC-PTM in Idle mode for NB-IoT (clause 6.16.2)

- 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)

- NRS presence on non-anchor paging carriers (clause 6.17.7)

- DL channel quality reporting in Msg3 for non-anchor carrier (clause 6.17.8)

- Assistance information for inter-RAT cell selection to/from NB-IoT (clause 6.17.9)

- RRC Connection Re-establishment for the Control Plane CIoT 5GS Optimisation (clause 6.18.3)

- NB-IoT/5GC (clause 6.18.4)

- MO-EDT for Control Plane CIoT 5GS Optimisation (clause 6.18.5)

- AS RAI (clause 6.18.6)

- Cell Reselection Measurements Triggering based on Service Time (clause 6.19.1)

- Discontinuous coverage (clause 6.19.2).

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

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| Next Change |

### 4.3.12 SON parameters

#### 4.3.12.1 *rach-Report*

This parameter defines whether the UE supports delivery of *rachReport* upon request from the network.

#### 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*.

#### 4.3.12.3 *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*.

### 4.3.13 UE-based network performance measurement parameters

#### 4.3.13.1 *loggedMeasurementsIdle*

This parameter defines whether the UE supports logged measurements including logging in *any cell selection* state in RRC\_IDLE upon request from the network as specified in TS 36.331 [5] and TS 36.304 [14]. A UE that supports logged measurements in RRC\_IDLE shall also support a minimum of 64kB memory for log storage.

#### 4.3.13.2 *standaloneGNSS-Location*

This parameter defines whether the UE is equipped with a standalone GNSS receiver that may be used to provide detailed location information in RRC measurement report and logged measurements in RRC\_IDLE. The GNSS receiver may be used to provide coarse location for access to the NTN cell.

#### 4.3.13.3 Void

#### 4.3.13.4 *loggedMBSFNMeasurements-r12*

This parameter defines whether the UE supports logged MBSFN measurement in RRC\_IDLE and RRC\_CONNECTED upon request from the network. A UE that supports logged MBSFN measurements shall also support a minimum of 64kB memory for log storage. A UE that supports logged MBSFN measurements shall also support logged measurements in RRC\_IDLE upon request from the network.

#### 4.3.13.5 *locationReport-r14*

This parameter defines whether the UE supports reporting of its geographical location information to eNB.

#### 4.3.13.6 *loggedMeasBT-r15*

This parameter indicates whether the UE supports Bluetooth measurements in RRC\_IDLE mode.

#### 4.3.13.7 *loggedMeasWLAN-r15*

This parameter indicates whether the UE supports WLAN measurements in RRC\_IDLE mode.

#### 4.3.13.8 *immMeasBT-r15*

This parameter indicates whether the UE supports Bluetooth measurements in RRC\_CONNECTED mode.

#### 4.3.13.9 *immMeasWLAN-r15*

This parameter indicates whether the UE supports WLAN measurements in RRC\_CONNECTED mode.

#### 4.3.13.10 *ul-PDCP-AvgDelay-r16*

This parameter indicates whether the UE supports UL PDCP Packet Average Delay measurement (as specified in TS 38.314 [41]) and reporting in RRC\_CONNECTED state.

#### 4.3.13.11 *loggedMeasIdleEventL1-r17*

This parameter defines whether the UE supports event triggered logged measurements for *eventL1* in RRC\_IDLE upon request from the network. A UE indicating support of *loggedMeasIdleEventL1-r17* shall also indicate support of *loggedMeasurementsIdle*.

#### 4.3.13.12 *loggedMeasIdleEventOutOfCoverage-r17*

This parameter defines whether the UE supports event triggered logged measurements for event *outOfCoverage* in RRC\_IDLE upon request from the network. A UE indicating support of *loggedMeasIdleEventOutOfCoverage-r17* shall also indicate support of *loggedMeasurementsIdle*.

#### 4.3.13.13 *loggedMeasUncomBarPre-r17*

This parameter indicates whether the UE supports logging of uncompensated barometric pressure measurement in RRC\_IDLE mode.

#### 4.3.13.14 *immMeasUncomBarPre-r17*

This parameter indicates whether the UE supports uncompensated barometric pressure measurement in RRC\_CONNECTED mode.

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| Next Change |

### 4.3.38 IoT NTN parameters

#### 4.3.38.1 *ntn-Connectivity-EPC-r17*

This field indicates whether the UE supports NTN access. This field is only applicable if the UE supports *ce-ModeA-r13* or any *ue-Category-NB*. If the UE indicates this capability the UE shall support the following enhancements:

- General:

- handling of *cellBarred-NTN-r17* and *trackingAreaList-r17* in *SystemInformationBlockType1(-NB)* as specified in TS 36.331 [5];

- reception of *SystemInformationBlockType31(-NB)* as specified in TS 36.331 [5];

- derivation of its position based on its GNSS measurements;

- reporting of the remaining GNSS validity duration as specified in TS 36.331 [5];

- PDCP:

- if the UE supports *ce-ModeA-r13, discardTimerExt-r17* as specified in TS 36.331 [5];

- RLC:

- *t-ReorderingExt-r17* as specified in TS 36.331 [5];

- MAC:

- estimation of UE-gNB RTT as specified in TS 36.321 [4];

- delaying the start of the RA response window as specified in TS 36.321 [4];

*-* delaying the start of the *mac-ContentionResolutionTimer* as specified in TS 36.321 [4];

- if the UE supports *ce-ModeA-r13* orif the UE supports any *ue-Category-NB* and supports *sr-WithoutHARQ-ACK-r15, sr-ProhibitTimerExt-r17* as specified in TS 36.331 [5];

- Physical layer:

- calculation of the UE specific TA in RRC\_IDLE and RRC\_CONNECTED state based on its GNSS-acquired position and the serving satellite ephemeris as specified in TS 36.211 [17];

- calculation of the common TA in RRC\_IDLE and RRC\_CONNECTED as specified in TS 36.213 [22];

- frequency pre-compensation using *k-Offset-r17* and *k-Mac-r17* as specified in TS 36.213 [22];

- timing relationship enhancements using higher layer parameters *k-Offset-r17* and *k-Mac-r17* as specified in TS 36.213 [22];

- segmented UL transmission using higher layer parameters *(n)prach-TxDuration-r17*, *pucch-TxDuration-r17* and *(n)pusch-TxDuration-r17* as specified in TS 36.331 [5].

A UE indicating support of *ce-ModeA-r13* and *ntn-Connectivity-EPC-r17* shall also indicate support of *standaloneGNSS-Location*. A UE indicating support for any *ue-Category-NB* and *ntn-Connectivity-EPC-r17* is assumed to have GNSS location capability*.*

#### 4.3.38.2 *ntn-TA-Report-r17*

This field indicates whether the UE supports Timing advance reporting in NTN cell as specified in TS 36.321 [4]. This feature is only applicable if the UE supports *ntn-Connectivity-EPC-r17*.

#### 4.3.38.3 *ntn-PUR-TimerDelay-r17*

This field indicates whether the UE supports delaying the start of the *pur-ResponseWindowTimer* for NTN operation as specified in TS36.321 [4]. This feature is only applicable if the UE supports *ntn-Connectivity-EPC-r17*. A UE indicating support of *ntn-PUR-TimerDelay-r17* shall also indicate support of *pur-CP-EPC-CE-ModeA-r16* or *pur-UP-EPC-CE-ModeA-r16* or *pur-CP-EPC-r16* or *pur-UP-EPC-r16.*

#### 4.3.38.4 *ntn-OffsetTimingEnh-r17*

This field indicates whether the UE supports timing relationship enhancements using Differential Koffset as specified in TS 36.321 [4] and TS 36.213 [22]. This feature is only applicable if the UE supports *ntn-Connectivity-EPC-r17*.

#### 4.3.38.5 *ntn-ScenarioSupport-r17*

This field indicates whether the UE supports NTN features in GSO or NGSO scenario. The UE indicating support of *ntn-ScenarioSupport-r17* shall also indicate support of *ntn-Connectivity-EPC-r17*. If a UE does not include this field but includes *ntn-Connectivity-EPC-r17*, the UE supports the NTN features for both GSO and NGSO scenarios.

#### 4.3.38.X *ntn-SegmentedPrecompensationGaps-r17*

This field indicates the supported gap length between segments for PUSCH and PUCCH required by a UE supporting ce-ModeA-r13 or by UE supporting UE-category-NB for TA pre-compensation. This feature is only applicable if the UE supports either UE-category-NB or ce-ModeA-r13 and also supports ntn-Connectivity-EPC-r17. If a UE does not include this field but includes ntn-Connectivity-EPC-r17, in case of overlapped transmission between successive uplink segments, UE shall follow the procedure specified in TS 36.213 [22].

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| End of Changes |