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Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Radio Access Network;

Evolved Universal Terrestrial Radio Access (E-UTRA);

LTE Positioning Protocol (LPP)

(Release 17)

 

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# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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x the first digit:

1 presented to TSG for information;

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3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

# 1 Scope

See TS 37.355 [38].

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]-[37] Void

[38] 3GPP TS 37.355: "LTE Positioning Protocol (LPP)".

# 3 to 7 Void

# 8 LPP Procedures, IE Abstract Syntax Definition etc.

See TS 37.355 [38].

Annex A (informative):  
Change History

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2009-10 | RAN2 #67bis | R2-096252 |  |  |  | RAN2 agreed TS 36.355 v0.1.0 | 0.1.0 |
| 2009-11 | RAN2 #68 | R2-097492 |  |  |  | RAN2 agreed TS 36.355 v2.0.0 | 2.0.0 |
| 2009-12 | RP-46 | RP-091208 |  |  |  | RAN #46 approval of TS 36.355 | 9.0.0 |
| 2010-03 | RP-47 | RP-100304 | 0001 | - |  | Clarification on Position location | 9.1.0 |
|  | RP-47 | RP-100304 | 0002 | - |  | Clarification on UE Rx-Tx time difference supporting capability | 9.1.0 |
|  | RP-47 | RP-100304 | 0003 | 2 |  | Completion of LPP common material | 9.1.0 |
|  | RP-47 | RP-100304 | 0004 | 5 |  | Completion of OTDOA in LPP | 9.1.0 |
|  | RP-47 | RP-100304 | 0006 | - |  | Provision of Frame Drift Information in Network Time | 9.1.0 |
|  | RP-47 | RP-100304 | 0007 | - |  | Clarification of measurement reference point | 9.1.0 |
|  | RP-47 | RP-100304 | 0010 | - |  | GNSS-DifferentialCorrectionsSupport | 9.1.0 |
|  | RP-47 | RP-100304 | 0011 | - |  | BSAlign Indication in GNSS Reference Time | 9.1.0 |
|  | RP-47 | RP-100304 | 0012 | 1 |  | Changes to reflect LPP ASN.1 review | 9.1.0 |
|  | RP-47 | RP-100304 | 0013 | 1 |  | Introduction of LPP reliability sublayer | 9.1.0 |
|  | RP-47 | RP-100304 | 0015 | - |  | LPP error procedures and conditions | 9.1.0 |
|  | RP-47 | RP-100304 | 0016 | - |  | Triggered Location Information Transfer due to Cell Change | 9.1.0 |
| 2010-06 | RP-48 | RP-100558 | 0018 | 2 |  | Addition of need codes to optional LPP information elements | 9.2.0 |
|  | RP-48 | RP-100558 | 0019 | 1 |  | Miscellaneous corrections to LPP stage 3 | 9.2.0 |
|  | RP-48 | RP-100558 | 0020 | 1 |  | Small corrections to LPP specification | 9.2.0 |
|  | RP-48 | RP-100558 | 0021 | - |  | Clarifications of OTDOA parameters | 9.2.0 |
|  | RP-48 | RP-100558 | 0022 | 1 |  | Signalling support for PRS muting in OTDOA | 9.2.0 |
|  | - | - | - | - |  | Two times capital R replaced by lower case r in "MeasuredResultsElement" (undoing not intended change) | 9.2.1 |
| 2010-09 | RP-49 | RP-100852 | 0024 | - |  | Addition of an EPDU to an LPP Error and LPP Abort | 9.3.0 |
|  | RP-49 | RP-100852 | 0026 | - |  | Division of LPP into Separate ASN.1 Modules with a Global Identifier | 9.3.0 |
|  | RP-49 | RP-100852 | 0028 | - |  | Proposed Corrections to LPP Reliable Transport | 9.3.0 |
|  | RP-49 | RP-100852 | 0029 | - |  | Proposed Corrections to the PeriodicalReportingCriteria in LPP | 9.3.0 |
|  | RP-49 | RP-100852 | 0030 | 1 |  | Various corrections and clarifications to LPP | 9.3.0 |
|  | RP-49 | RP-100852 | 0031 | - |  | Support of functional components for LPP reliable transport | 9.3.0 |
|  | RP-49 | RP-100852 | 0032 | 1 |  | Introduction of EPDU ID requested by OMA LOC | 9.3.0 |
|  | RP-49 | RP-100852 | 0035 | 1 |  | Several corrections in LPP | 9.3.0 |
|  | RP-49 | RP-100852 | 0036 | - |  | Clarification to Assistance Data Transfer Procedure | 9.3.0 |
| 2010-12 | RP-50 | RP-101207 | 0037 | - |  | Correction of reliable transport terminology in description of LPP-Message | 9.4.0 |
|  | RP-50 | RP-101207 | 0038 | - |  | One cell with known SFN in OTDOA assistance data | 9.4.0 |
|  | RP-50 | RP-101207 | 0039 | 1 |  | UE frequency capability for LPP | 9.4.0 |
|  | RP-50 | RP-101207 | 0041 | - |  | Correction to LPP reliable transport | 9.4.0 |
|  | RP-50 | RP-101207 | 0042 | - |  | Correction to LPP Error procedure | 9.4.0 |
|  | RP-50 | RP-101207 | 0043 | - |  | Addition of missing reference to LPPe | 9.4.0 |
|  | RP-50 | RP-101207 | 0044 | 2 |  | Correction to the ODTOA assistance data | 9.4.0 |
|  | RP-50 | RP-101226 | 0040 | - |  | Update of 'serving cell' terminology in 36.355 | 10.0.0 |
| 2011-03 | RP-51 | RP-110269 | 0046 | - |  | Editorial corrections to 36.355 | 10.1.0 |
|  | RP-51 | RP-110269 | 0048 | - |  | Removal of FFS for retransmission timer in LPP | 10.1.0 |
|  | RP-51 | RP-110269 | 0050 | - |  | Correction to code phase encoding in GNSS acquisition assistance | 10.1.0 |
|  | RP-51 | RP-110269 | 0052 | 1 |  | Clarification on SFN provided with OTDOA measurement | 10.1.0 |
|  | RP-51 | RP-110269 | 0053 | 1 |  | Introduction of OTDOA inter-freq RSTD measurement indication procedure | 10.1.0 |
|  | RP-51 | RP-110269 | 0057 | - |  | Small corrections in 36.355 | 10.1.0 |
|  | RP-51 | RP-110269 | 0058 | 3 |  | Further corrections to the OTDOA assistance data | 10.1.0 |
| 2011-06 | RP-52 | RP-110830 | 0060 | - |  | Clarifications to description of OTDOA positioning fields | 10.2.0 |
| 2011-09 | RP-53 | RP-111279 | 0062 | 1 |  | Various corrections to LPP | 10.3.0 |
|  | RP-53 | RP-111279 | 0064 | - |  | Mandatory support of PRS for OTDOA measurements | 10.3.0 |
| 2011-12 | RP-54 | RP-111709 | 0066 | - |  | Clarification of packed encoding rules of LPP | 10.4.0 |
|  | RP-54 | RP-111709 | 0068 | - |  | Clarification of first bit in BIT STRING definitions | 10.4.0 |
| 2012-06 | RP-56 | RP-120808 | 0071 | - |  | Usage of additionalInformation IE | 10.5.0 |
| 2012-09 | RP-57 | RP-121424 | 0074 | 2 |  | Corrections to GNSS Acquisition Assistance Data | 10.6.0 |
|  | RP-57 | - | - | - |  | Upgrade to the Release 11 - no technical change | 11.0.0 |
| 2012-12 | RP-58 | RP-121931 | 0077 | - |  | Correcting the referencing of QoS parameters | 11.1.0 |
|  | RP-58 | RP-121931 | 0080 | - |  | Correction to missing field description in GNSS-AcquisitionAssistance IE | 11.1.0 |
| 2013-03 | RP-59 | RP-130237 | 0083 | 1 |  | Extending E-UTRA Frequency Band and EARFCN value range | 11.2.0 |
|  | RP-59 | RP-130230 | 0086 | - |  | Correction to PRS Muting Configuration | 11.2.0 |
| 2013-06 | RP-60 | RP-130803 | 0088 | - |  | Correction for ASN.1 errors from CR0083r1 | 11.3.0 |
|  | RP-60 | RP-130803 | 0091 | - |  | Correction to integer code phase field description in GNSS Acquisition Assistance | 11.3.0 |
|  | RP-60 | RP-130803 | 0093 | - |  | Correction to serving cell terminology | 11.3.0 |
|  | RP-60 | RP-130803 | 0094 | - |  | Encoding of LPP IEs | 11.3.0 |
| 2013-09 | RP-61 | RP-131314 | 0098 | - |  | Correction on svReqList | 11.4.0 |
| 2013-12 | RP-62 | RP-131984 | 0103 | - |  | Correction to missing capability indication for inter-frequency RSTD measurements | 11.5.0 |
|  | RP-62 | RP-131984 | 0107 | 1 |  | Correction to Galileo assistance data elements | 11.5.0 |
|  | RP-62 | RP-132000 | 0104 | 1 |  | Stage 3 CR of TS 36.355 for introducing BDS in LTE | 12.0.0 |
|  | RP-62 | RP-131984 | 0108 | - |  | Correction to Galileo assistance data elements | 12.0.0 |
| 2014-03 | RP-63 | RP-140342 | 0112 | 1 |  | Clarification to gnss-DayNumber | 12.1.0 |
| 2014-06 | RP-64 | RP-140871 | 0119 | - |  | Signaling of OTDOA Neighbour Cell Information and Measurements | 12.2.0 |
| 2014-12 | RP-66 | RP-142114 | 0122 | - |  | Correction to Galileo Assistance Data | 12.3.0 |
|  | RP-66 | RP-142114 | 0123 | - |  | Addition of an Early Position Fix to LPP | 12.3.0 |
|  | RP-66 | RP-142120 | 0124 | - |  | BDS update to version 2.0 | 12.3.0 |
| 2015-03 | RP-67 | RP-150369 | 0126 | 2 |  | Correction of GLONASS system time | 12.4.0 |
|  | RP-67 | RP-150376 | 0125 | 1 |  | LPP clean-up | 12.4.0 |
| 2015-12 | RP-70 | RP-152055 | 0134 | 1 |  | Correction to the definition of Need codes | 12.5.0 |
| 2015-12 | RP-70 | RP-152068 | 0137 | 3 |  | RAT-Independent positioning enhancements | 13.0.0 |
| 2016-03 | RP-71 | RP-160463 | 0138 | 1 |  | Correction to GLONASS IOD value range | 13.1.0 |
|  | RP-71 | RP-160470 | 0140 | 1 |  | r13 Information Element correction | 13.1.0 |
|  | RP-71 | RP-160470 | 0141 | - |  | WLAN AP Identifier correction | 13.1.0 |
|  | RP-71 | RP-160470 | 0142 | 1 |  | LPP clean-up | 13.1.0 |
| 2016-09 | RP-73 | RP-161750 | 0143 | 4 |  | Correction of ECID positioning for TDD | 13.2.0 |
| 2016-12 | RP-74 | RP-162317 | 0160 | 1 |  | Clarification of WLAN RSSI value range | 13.3.0 |
| 2016-12 | RP-74 | RP-162326 | 0155 | 1 |  | CR for 36.355 Further Indoor positioning enhancements | 14.0.0 |
|  | RP-74 | RP-162327 | 0157 | - |  | Barometric Pressure Uncertainty IEs | 14.0.0 |
|  | RP-74 | RP-162326 | 0161 | 1 |  | Introduction of Further Indoor Positioning Enhancements | 14.0.0 |
| 2017-03 | RP-75 | RP-170636 | 0162 | 3 | B | Introduction of positioning for further enhanced MTC | 14.1.0 |
|  | RP-75 | RP-170642 | 0163 | - | C | Addition of periodical and triggered reporting capabilitiy signalling | 14.1.0 |
|  | RP-75 | RP-170642 | 0165 | 2 | F | Further Indoor positioning enhancements corrections | 14.1.0 |
|  | RP-75 | RP-170637 | 0166 | - | B | Introduction of positioning support for NB-IoT | 14.1.0 |
| 2017-06 | RP-76 | RP-171224 | 0169 | 3 | F | Compact Signal Measurement Information for OTDOA | 14.2.0 |
|  | RP-76 | RP-171223 | 0171 | 1 | F | Correction to PRS Subframe Offset | 14.2.0 |
|  | RP-76 | RP-171223 | 0173 | 1 | F | Correction to SFN time stamp in OTDOA Signal Measurement Information | 14.2.0 |
|  | RP-76 | RP-171223 | 0174 | 1 | F | Correction to OTDOA capabilities | 14.2.0 |
|  | RP-76 | RP-171224 | 0175 | 1 | F | Correction to NPRS | 14.2.0 |
|  | RP-76 | RP-171225 | 0176 | 2 | F | LPP clean-up | 14.2.0 |
|  | RP-76 | RP-171224 | 0177 | - | F | Corrections to number of NPRS carriers and ECID measurements for NB-IoT | 14.2.0 |
|  | RP-76 | RP-171224 | 0178 | 1 | F | Removal of FFS for retransmission timer in LPP | 14.2.0 |
|  | RP-76 | RP-171224 | 0181 | 1 | F | Signalling optimisation for NB-IoT Enhancements | 14.2.0 |
| 2017-09 | RP-77 | RP-171913 | 0182 | 2 | F | Clarification on definition of PRS Occasion Group | 14.3.0 |
|  | RP-77 | RP-171914 | 0183 | 1 | F | Additional OTDOA Capabilities | 14.3.0 |
|  | RP-77 | RP-171911 | 0184 | - | F | Clarification to *GNSS-TimeModelList* | 14.3.0 |
|  | RP-77 | RP-171913 | 0185 | 1 | F | Minor corrections on TS 36.355 for Rel-14 MTC | 14.3.0 |
| 2017-12 | RP-78 | RP-172616 | 0187 | 2 | F | Correction on PRS hopping configuration | 14.4.0 |
| 2018-03 | RP-79 | RP-180446 | 0189 | 1 | F | Segmentation of LPP Messages | 14.5.0 |
| 2018-04 | RP-79 |  |  |  |  | New version to fix ASN.1 formatting | 14.5.1 |
| 2018-06 | RP-80 | RP-181235 | 0202 | 2 | F | Clarification for NRSRQ reporting with E-CID | 14.6.0 |
| 2018-06 | RP-80 | RP-181219 | 0204 | 2 | B | Introduction of IMU support for OTDOA | 15.0.0 |
|  | RP-80 | RP-181219 | 0205 | 1 | B | Addition of RTK and PPP support | 15.0.0 |
|  | RP-80 | RP-181219 | 0207 | 1 | B | Addition of broadcast of positioning assistance data | 15.0.0 |
|  | RP-80 | RP-181215 | 0209 | 1 | B | Addition of NR Support | 15.0.0 |
|  | RP-80 | RP-181252 | 0210 | 1 | B | Addition of NB-IoT TDD support | 15.0.0 |
| 2018-09 | RP-81 | RP-181963 | 0215 | 1 | A | Support for NPRS enhancements | 15.1.0 |
|  | RP-81 | RP-181945 | 0218 | 1 | F | Corrections to TDD in 36.355 | 15.1.0 |
|  | RP-81 | RP-181961 | 0221 | 3 | A | Correction to RSRQ range in 36.355 | 15.1.0 |
|  | RP-81 | RP-181942 | 0222 | 1 | F | OTDOA Assistance Data Request for NR | 15.1.0 |
|  | RP-81 | RP-181960 | 0223 | - | F | LPP clean-up | 15.1.0 |
|  | RP-81 | RP-181952 | 0224 | 1 | F | GAD shapes for high accuracy positioning | 15.1.0 |
|  | RP-81 | RP-181952 | 0226 | 1 | B | Positioning SIB value tag and expiration time | 15.1.0 |
| 2018-12 | RP-82 | RP-182672 | 0213 | 3 | F | Addition of TDD UL/DL configuration to OTDOA assistance data | 15.2.0 |
|  | RP-82 | RP-182681 | 0228 | 2 | F | Introduction of TDD UL/DL configuration for NB-IoT in 36.355 | 15.2.0 |
|  | RP-82 | RP-182659 | 0229 | 3 | F | SFN offset for OTDOA | 15.2.0 |
|  | RP-82 | RP-182674 | 0230 | 1 | F | Alignment of IE/field names between LPP and RRC specifications | 15.2.0 |
|  | RP-82 | RP-182672 | 0232 | 1 | F | Sensor Assistance Data Elements Correction | 15.2.0 |
| 2019-03 | RP-83 | RP-190550 | 0234 | 3 | F | Stage 2 and stage 3 sensor methods description alignment | 15.3.0 |
| 2019-06 | RP-84 | RP-191376 | 0239 | 1 | F | Minor corrections on NR Support | 15.4.0 |
|  | RP-84 | RP-191384 | 0240 | 4 | F | Periodic assistance data transfer with cell ID change procedure | 15.4.0 |
| 2019-09 | RP-85 | RP-192196 | 0243 | 1 | F | Distinguishing Location Source when sensor method is used | 15.5.0 |
| 2019-12 | RP-86 | RP-192449 | 0249 | - | F | Turning TS 36.355 into a pointer to TS 37.355 (for LTE & NR) | 15.6.0 |
| 2020-07 | RP-88 |  |  |  |  | Upgraded to Release 16 without technical changes | 16.0.0 |
| 2022-03 | RP-95 |  |  |  |  | Upgraded to Release 17 without technical changes | 17.0.0 |