# ETSI TS 137 571-2 V9.2.0 (2012-07)


**Universal Mobile Telecommunications System (UMTS);**
**LTE;**
**Universal Terrestrial Radio Access (UTRA)**
**and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC);**
**User Equipment (UE) conformance specification**
**for UE positioning;**
**Part 2: Protocol conformance**
**(3GPP TS 37.571-2 version 9.2.0 Release 9)**

Reference
RTS/TSGR-0537571-2v920

Keywords
LTE,UMTS

***ETSI***

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# Foreword

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# Contents

# Foreword

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

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# Introduction

The present document is part 2 of a multi-part TS:

3GPP TS 37.571-1: Universal Terrestrial Radio Access (UTRA) and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 1: Conformance test specification.

**3GPP TS 37.571-2: Universal Terrestrial Radio Access (UTRA) and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 2: Protocol conformance.**

3GPP TS 37.571-3: Universal Terrestrial Radio Access (UTRA) and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 3: Implementation Conformance Statement (ICS).

3GPP TS 37.571-4: Universal Terrestrial Radio Access (UTRA) and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 4: Test suites.

3GPP TS 37.571-5: Universal Terrestrial Radio Access (UTRA) and Evolved UTRA (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification for UE positioning; Part 5: Test scenarios and assistance data.

# 1 Scope

The present document specifies the protocol conformance testing for the 3rd Generation UTRAN and E-UTRAN User Equipment (UE) supporting UE positioning.

This is the second part of a multi-part test specification. The following information can be found in this part:

- the overall protocol conformance test structure;
- the protocol conformance test configurations;
- the conformance requirement and reference to the core specifications;
- the test purposes; and
- a brief description of the test procedure, the specific test requirements and short message exchange table.

The Implementation Conformance Statement (ICS) pro-forma could be found in the 3rd part of the present document.

The present document is valid for UE supporting UE positioning implemented according to 3GPP releases starting from Release 99 up to the Release indicated on the cover page of the present document.

# 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] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.271: "Functional stage 2 description of Location Services (LCS) ".

[3] 3GPP TS 36.305: "Stage 2 functional specification of User Equipment (UE) positioning in E-UTRAN".

[4] 3GPP TS 36.355: "LTE Positioning Protocol (LPP)".

[5] 3GPP TS 24.171: "Control Plane Location Services (LCS) procedures in the Evolved Packet System (EPS)".

[6] 3GPP TS 24.030: "Location Services (LCS); Supplementary service operations; Stage 3".

[7] 3GPP TS 24.080: "Mobile radio interface layer 3 supplementary services specification; Formats and coding".

[8] 3GPP TS 36.508: "Common test environments for User Equipment (UE)".

[9] 3GPP TS 37.571-1: "User Equipment (UE) conformance specification for UE positioning; Part 1: Conformance test specification".

[10] 3GPP TS 37.571-3: "User Equipment (UE) conformance specification for UE positioning; Part 3: Implementation Conformance Statement (ICS)".

[11] 3GPP TS 37.571-4: "User Equipment (UE) conformance specification for UE positioning; Part 4: Test suites".

[12] 3GPP TS 37.571-5: "User Equipment (UE) conformance specification for UE positioning; Part 5: Test scenarios and assistance data".

[13] 3GPP TS 36.509: "Special conformance testing functions for User Equipment (UE)".

[14] 3GPP TS 34.123-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".

[15] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[16] 3GPP TS 34.108: "Common Test Environments for User Equipment (UE) Conformance Testing".

[17] 3GPP TS 25.331: "RRC Protocol Specification".

[18] 3GPP TS 34.109: "Terminal logical test interface; Special conformance testing functions".

[19] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[20] 3GPP TS 33.102: "3G security; Security architecture".

[21] ICD-GPS-200: "Navstar GPS Space Segment/Navigation User Interface".

[22] 3GPP TS 23.171: "Location Services (LCS); Functional description; Stage 2 (UMTS)".

[23] GSM TS 03.71: "Location Services (LCS); Functional description; Stage 2".

[24] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[25] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".

[26] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[27] 3GPP TS 22.101: "Service aspects; Service principles".

[28] OMA-TS-LPPe-V1_0: "LPP Extensions Specification", Open Mobile Alliance.

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], TS 23.271 [2],

TS 36.305 [3], TS 36.355 [4] apply.

## 3.2 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].

| | |
|---|---|
| DL | Downlink |
| LCS | Location Services |
| LPP | LTE Positioning Protocol |
| MO-LR | Mobile Originated Location Request |
| MT-LR | Mobile Terminated Location Request |
| NAS | Non-Access-Stratum |
| NI-LR | Network Induced Location Request |
| UL | Uplink |

# 4 Default Conditions for UTRAN

## 4.1 Default system information

Default system information, as specified in 3GPP TS 34.108 [16] subclause 6.1, is broadcasted for the A-GPS test cases in subclause 6.1. For the A-GNSS test cases in subclause 6.2, the default system information, as specified in 3GPP TS 36.508 [8], is broadcasted. SIB15/SIB15.x are not broadcasted unless otherwise stated in the specific test cases.

## 4.2 Simulated A-GPS and A-GNSS environment

During A-GPS and A-GNSS tests the SS shall generate satellite signals that are of a sufficient number and strength not to prevent the UE from responding to a positioning request with a valid measurement response. Any assistance data provided during these tests shall be consistent with the satellite signals generated during these tests.

It is considered that six satellite signals with the level of the simulated satellites all at -125 dBm ± 6 dB should be suitable, however this does not imply any conformance requirements on the UE.

Suitable GPS and GNSS scenarios together with associated assistance data are defined in TS 37.571-5 clause 5.2.7.

The accuracy of the GPS time-of-week and/or GANSS time-of-day in the provided assistance data shall be within ± 2 seconds relative to the GPS and/or GANSS time in the system simulator.

During A-GNSS signalling tests, the SS shall generate all the UE supported GNSS satellite signals.

### 4.2.1 A-GNSS sub-test cases

The A-GNSS signalling test cases in subclause 6.2 may include several sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined in the Table below. The detailed assistance data depend on the particular sub-test case as defined in subclause 4.4.

**Table 4.2.1-1: Sub-Test Case Number Definition for UTRA**

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

## 4.3 A-GPS assistance data sets

This subclause defines the assistance data sets supplied by the SS in A-GPS test cases specified in subclause 6.1.

Throughout this subclause, "adequate assistance data" means the assistance data used in test cases where it is expected that a UE supporting A-GPS will be able to perform the requested positioning operation using the supplied assistance data, and "inadequate assistance data" is the assistance data used in test cases that expect that the UE will be unable to perform the requested operation. The values of all the fields in all cases are defined in TS 37.571-5 clause 5.2.7.

### 4.3.1 Adequate assistance data for UE-based A-GPS

For UE-based test cases requiring adequate assistance data, the IE "UE positioning GPS assistance data" is spread across two separate MEASUREMENT CONTROL messages, and set as follows:

First MEASUREMENT CONTROL MESSAGE:

| | | |
|---|---|---|
| - UE positioning GPS assistance data | | |
| - UE positioning GPS reference time | | |
| - GPS week | Set according to 4.2 | |
| - GPS Week Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GPS TOW msec | Set according to 4.2 | |
| - UTRAN GPS reference time | Not present | |
| - UE Positioning GPS Reference Time Uncertainty | Set according to 4.2 | Rel-7 UE or later |
| - SFN-TOW uncertainty | Not present | |
| - $T_{UTRAN-GPS}$ drift rate | Not present | |
| - GPS TOW assist | Not present | |
| - UE positioning GPS reference UE position | Set according to 4.2 | |
| - UE positioning GPS DGPS corrections | Not present | |
| - UE positioning GPS navigation model | | |
| - Satellite information | For satellites 1-3 | |
| - SatID | Set according to 4.2 | |
| - Satellite status | NS NN | |
| - GPS ephemeris and clock corr. param. | Set according to 4.2 | |
| - UE positioning GPS ionospheric model | Set according to 4.2 | |
| - UE positioning GPS UTC model | Not present | |
| - UE positioning GPS almanac | Not present | |
| - UE positioning GPS acquisition assistance | Not present | |
| - UE positioning GPS real-time integrity | Not present | |

Second MEASUREMENT CONTROL message:

| | |
|---|---|
| - UE positioning GPS assistance data | |
| - UE positioning GPS reference time | Not present |
| - UE positioning GPS reference UE position | Not present |
| - UE positioning GPS DGPS corrections | Not present |
| - UE positioning GPS navigation model | |
| - Satellite information | For satellites 4-6 |
| - SatID | Set according to 4.2 |
| - Satellite status | NS NN |
| - GPS ephemeris and clock corr. param. | Set according to 4.2 |
| - UE positioning GPS ionospheric model | Not present |
| - UE positioning GPS UTC model | Not present |
| - UE positioning GPS almanac | Not present |
| - UE positioning GPS acquisition assistance | Not present |
| - UE positioning GPS real-time integrity | Not present |

### 4.3.2 Inadequate assistance data for UE-based A-GPS

For UE-based test cases requiring inadequate assistance data, the IE "UE positioning GPS assistance data" is set to "Not present" in the MEASUREMENT CONTROL message.

### 4.3.3 Adequate assistance data for UE-assisted A-GPS

For UE-assisted test cases requiring adequate assistance data, the IE "UE positioning GPS assistance data" is set as follows for the first MEASUREMENT CONTROL message:

| | | |
|---|---|---|
| - UE positioning GPS assistance data | | |
| - UE positioning GPS reference time | | |
| - GPS week | Set according to 4.2 | |
| - GPS Week Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GPS TOW msec | Set according to 4.2 | |
| - UTRAN GPS reference time | Not present | |
| - UE Positioning GPS Reference Time Uncertainty | Set according to 4.2 | Rel-7 UE or later |
| - SFN-TOW uncertainty | Not present | |
| - $T_{UTRAN-GPS}$ drift rate | Not present | |
| - GPS TOW assist | Not present | |
| - UE positioning GPS reference UE position | Not present | |
| - UE positioning GPS DGPS corrections | Not present | |
| - UE positioning GPS navigation model | Not present | |
| - UE positioning GPS ionospheric model | Not present | |
| - UE positioning GPS UTC model | Not present | |
| - UE positioning GPS almanac | Not present | |
| - UE positioning GPS acquisition assistance | | |
| - GPS TOW msec | Set according to 4.2 | |
| - UTRAN GPS reference time | Not present | |
| - UE Positioning GPS Reference Time Uncertainty | Set according to 4.2 | Rel-7 UE or later |
| - Satellite information | Set according to 4.2 | |
| - Extra Doppler | Set according to 4.2 | |
| - Azimuth and Elevation | Set according to 4.2 | |
| - Azimuth and Elevation LSB | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning GPS real-time integrity | Not present | |

If the UE requests further assistance data, the SS sends subsequent MEASUREMENT CONTROL messages containing the assistance data fields requested by the UE that are available in the SS as specified in TS 37.571-5 clause 5.2.7 and in clause 4.3.5.

### 4.3.4 Inadequate assistance data for UE-assisted A-GPS

For UE-assisted test cases requiring inadequate assistance data, the IE "UE positioning GPS assistance data" is set to "Not present" in the MEASUREMENT CONTROL message.

### 4.3.5 Response to assistance data requests from UE

If the SS needs to send assistance data in response to a request for additional assistance data from the UE, or in response to an MO-LR request for assistance data, the IE "UE positioning GPS assistance data" is set as follows:

| | | |
|---|---|---|
| - UE positioning GPS assistance data | | |
| - UE positioning GPS reference time | Set according to 4.2 if requested by the UE | |
| - GPS week | Set according to 4.2 | |
| - GPS Week Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GPS TOW msec | Set according to 4.2 | |
| - UTRAN GPS reference time | Not present | |
| - UE Positioning GPS Reference Time Uncertainty | Set according to 4.2 | Rel-7 UE or later |
| - SFN-TOW uncertainty | Not present | |
| - $T_{UTRAN-GPS}$ drift rate | Not present | |
| - GPS TOW assist | Not present | |
| - UE positioning GPS reference UE position | Set according to 4.2 if requested by the UE | |
| - UE positioning GPS DGPS corrections | Not sent | |
| - UE positioning GPS navigation model | Set according to 4.2 if requested by the UE | |
| - Satellite information | For satellites 1-6 | |
| - SatID | Set according to 4.2 | |
| - Satellite status | NS NN | |
| - GPS ephemeris and clock corr. param. | Set according to 4.2 | |
| - UE positioning GPS ionospheric model | Set according to 4.2 if requested by the UE | |
| - UE positioning GPS UTC model | Not sent | |
| - UE positioning GPS almanac | Set according to 4.2 if requested by the UE | |
| - WNa | Set according to 4.2 | |
| - Complete Almanac Provided | True | Rel-10 UE or later |
| - Satellite information | Set according to 4.2 | |
| - SV Global Health | Not present | |
| - UE positioning GPS acquisition assistance | Set according to 4.2 if requested by the UE | |
| - GPS TOW msec | Set according to 4.2 | |
| - UTRAN GPS reference time | Not present | |
| - UE Positioning GPS Reference Time Uncertainty | Set according to 4.2 | Rel-7 UE or later |
| - Satellite information | Set according to 4.2 | |
| - Extra Doppler | Set according to 4.2 | |
| - Azimuth and Elevation | Set according to 4.2 | |
| - Azimuth and Elevation LSB | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning GPS real-time integrity | Not sent | |

If the UE requests the GPS navigation model then the SS provides navigation model satellite information for at most three satellites in any one MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY message; additional satellites are sent in subsequent MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY messages.

If the UE requests the GPS almanac then the SS provides almanac information spread across at least two MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY messages.

If the UE requests both GPS navigation model and almanac then the SS provides them in different MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY messages.

## 4.4 A-GNSS assistance data sets

This subclause defines the assistance data sets supplied by the SS in A-GNSS test cases specified in subclause 6.2. For A-GNSS sub-test cases which include the GPS L1 C/A signal, the A-GPS assistance data as defined in clause 4.3 apply.

Throughout this subclause, "adequate assistance data" means the assistance data used in test cases where it is expected that a UE supporting A-GNSS will be able to perform the requested positioning operation using the supplied assistance data, and "inadequate assistance data" is the assistance data used in test cases that expect that the UE will be unable to perform the requested operation. The values of all the fields in all cases are defined in 3GPP TS 37.571-5.

## 4.4.1 Adequate assistance data for UE-based A-GNSS

For UE-based GNSS test cases requiring adequate assistance data, the IE "UE positioning GANSS assistance data" is spread across one or more (dependent on the sub-test) separate MEASUREMENT CONTROL messages, and set as follows:

### 4.4.1.1 Sub-Test 1

First MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | Not present | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | | |
| - GANSS Day | Set according to 4.2 | |
| - GANSS Day Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GANSS TOD | Set according to 4.2 | |
| - GANSS TOD Uncertainty | Set according to 4.2 | |
| - GANSS Time ID | 2 (GLONASS) | |
| - UTRAN GANSS reference time | Not present | |
| - $T_{UTRAN-GANSS}$ drift rate | Not present | |
| - UE positioning GANSS reference UE position | Set according to 4.2 | |
| - UE positioning GANSS ionospheric model | Not present | |
| - UE positioning GANSS additional ionospheric Model | Not present | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | 3 (GLONASS) | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Not present | |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Not present | |
| - UE positioning GANSS additional navigation models | Set according to 4.2 | |
| - Non-Broadcast Indication | Not present | |
| - Satellite information | For satellites 1-6 | |
| - GANSS additional clock models | Model-4 | |
| - GANSS additional orbit models | Model-4 | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | Not present | |
| - UE positioning GANSS almanac | Not present | |
| - UE positioning GANSS UTC model | Not present | |
| - UE positioning GANSS additional UTC models | Not present | |
| - UE positioning GANSS auxiliary information | Set according to 4.2 | |
| - GANSS-ID-3 | | |
| - Aux Info List | For satellites 1-6 | |

#### 4.4.1.2 Sub-Test 2

First MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | Not present | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | | |
| - GANSS Day | Set according to 4.2 | |
| - GANSS Day Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GANSS TOD | Set according to 4.2 | |
| - GANSS TOD Uncertainty | Set according to 4.2 | |
| - GANSS Time ID | Not present | |
| - UTRAN GANSS reference time | Not present | |
| - $T_{UTRAN-GANSS}$ drift rate | Not present | |
| - UE positioning GANSS reference UE position | Set according to 4.2 | |
| - UE positioning GANSS ionospheric model | Set according to 4.2 | |
| - UE positioning GANSS additional ionospheric Model | Not present | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | Not present | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Not present | |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Set according to 4.2 | |
| - Non-Broadcast Indication | Not present | |
| - Satellite information | For satellites 1-N | |
| - GANSS clock model | Model-1 | |
| - GANSS orbit model | Model-1 | |
| - UE positioning GANSS additional navigation models | Not present | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | Not present | |
| - UE positioning GANSS almanac | Not present | |
| - UE positioning GANSS UTC model | Not present | |
| - UE positioning GANSS additional UTC models | Not present | |
| - UE positioning GANSS auxiliary information | Not present | |

Second MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark |
|---|---|
| **UE positioning GPS assistance data** | Not present |
| **UE positioning GANSS assistance data** | |
| - UE positioning GANSS reference time | Not present |
| - UE positioning GANSS reference UE position | Not present |
| - UE positioning GANSS ionospheric model | Not present |
| - UE positioning GANSS additional ionospheric Model | Not present |
| - UE positioning GANSS Earth orientation Parameters | Not present |
| - GANSS Generic Assistance Data | |
| - GANSS ID | Not present |
| - UE positioning GANSS SBAS ID | Not present |
| - GANSS Time Models | Not present |
| - UE positioning DGANSS corrections | Not present |
| - UE positioning GANSS navigation model | Set according to 4.2 |
| - Non-Broadcast Indication | Not present |
| - Satellite information | For satellites (N+1) – M |
| - GANSS clock model | Model-1 |
| - GANSS orbit model | Model-1 |
| - UE positioning GANSS additional navigation models | Not present |
| - UE positioning GANSS real-time integrity | Not present |
| - UE positioning GANSS data bit assistance | Not present |
| - UE positioning GANSS reference measurement information | Not present |
| - UE positioning GANSS almanac | Not present |
| - UE positioning GANSS UTC model | Not present |
| - UE positioning GANSS additional UTC models | Not present |
| - UE positioning GANSS auxiliary information | Not present |

### 4.4.1.3 Sub-Test 3

First MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark |
|---|---|
| **UE positioning GPS assistance data** | As defined in 4.3.1, First Measurement Control Message |
| **UE positioning GANSS assistance data** | |
| - UE positioning GANSS reference time | Not present |
| - UE positioning GANSS reference UE position | Not present |
| - UE positioning GANSS ionospheric model | Not present |
| - UE positioning GANSS additional ionospheric Model | Not present |
| - UE positioning GANSS Earth orientation Parameters | Not present |
| - GANSS Generic Assistance Data | |
| - GANSS ID | 1 (Modernized GPS) |
| - UE positioning GANSS SBAS ID | Not present |
| - GANSS Time Models | Not present |
| - UE positioning DGANSS corrections | Not present |
| - UE positioning GANSS navigation model | Not present |
| - UE positioning GANSS additional navigation models | Not present |
| - UE positioning GANSS real-time integrity | Not present |
| - UE positioning GANSS data bit assistance | Not present |
| - UE positioning GANSS reference measurement information | Not present |
| - UE positioning GANSS almanac | Not present |
| - UE positioning GANSS UTC model | Not present |
| - UE positioning GANSS additional UTC models | Not present |
| - UE positioning GANSS auxiliary information | |
| - GANSS-ID-1 | |
| - Aux Info List | For satellites 1-3 |

Second MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark |
|---|---|
| **UE positioning GPS assistance data** | As defined in 4.3.1, Second Measurement Control Message |
| **UE positioning GANSS assistance data** | |
| - UE positioning GANSS reference time | Not present |
| - UE positioning GANSS reference UE position | Not present |
| - UE positioning GANSS ionospheric model | Not present |
| - UE positioning GANSS additional ionospheric Model | Not present |
| - UE positioning GANSS Earth orientation Parameters | Not present |
| - GANSS Generic Assistance Data | |
| - GANSS ID | 1 (Modernized GPS) |
| - UE positioning GANSS SBAS ID | Not present |
| - GANSS Time Models | Not present |
| - UE positioning DGANSS corrections | Not present |
| - UE positioning GANSS navigation model | Not present |
| - UE positioning GANSS additional navigation models | Not present |
| - UE positioning GANSS real-time integrity | Not present |
| - UE positioning GANSS data bit assistance | Not present |
| - UE positioning GANSS reference measurement information | Not present |
| - UE positioning GANSS almanac | Not present |
| - UE positioning GANSS UTC model | Not present |
| - UE positioning GANSS additional UTC models | Not present |
| - UE positioning GANSS auxiliary information | |
| - GANSS-ID-1 | |
| - Aux Info List | For satellites 4-6 |

### 4.4.1.4 Sub-Test 4

First MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark |
|---|---|
| **UE positioning GPS assistance data** | As defined in 4.3.1, First Measurement Control Message |
| **UE positioning GANSS assistance data** | Not present |

Second MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark |
|---|---|
| **UE positioning GPS assistance data** | As defined in 4.3.1, Second Measurement Control Message |
| - UE positioning GPS UTC model | Set according to 4.2. |
| **UE positioning GANSS assistance data** | Not present |

Third MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | Not present | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | Not present | |
| - UE positioning GANSS reference UE position | Not present | |
| - UE positioning GANSS ionospheric model | Not present | |
| - UE positioning GANSS additional ionospheric Model | Not present | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | 3 (GLONASS) | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Set according to 4.2 | |
| - GANSS Time Model | | |
| - GANSS Time Model Reference Time | Set according to 4.2 | |
| - $T_{A0}$ | Set according to 4.2 | |
| - $T_{A1}$ | Not present | |
| - $T_{A2}$ | Not present | |
| - GNSS_TO_ID | 0 (GPS) | |
| - Week Number | Not present | |
| - Delta_T | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Not present | |
| - UE positioning GANSS additional navigation models | Set according to 4.2 | |
| - Non-Broadcast Indication | Not present | |
| - Satellite information | For satellites 1-6 | |
| - GANSS additional clock models | Model-4 | |
| - GANSS additional orbit models | Model-4 | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | Not present | |
| - UE positioning GANSS almanac | Not present | |
| - UE positioning GANSS UTC model | Not present | |
| - UE positioning GANSS additional UTC models | Not present | |
| - UE positioning GANSS auxiliary information | Set according to 4.2 | |
| - GANSS-ID-3 | | |
| - Aux Info List | For satellites 1-6 | |

## 4.4.2 Inadequate assistance data for UE-based A-GNSS

For UE-based test cases requiring inadequate assistance data, the IE "UE positioning GPS assistance data" and "UE positioning GANSS assistance data" is set to "Not present" in the MEASUREMENT CONTROL message.

## 4.4.3 Adequate assistance data for UE-assisted A-GNSS

For UE-assisted test cases requiring adequate assistance data, the IEs "UE positioning GPS assistance data" and "UE positioning GANSS assistance data" are set as follows:

#### 4.4.3.1 Sub-Test 1

MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | Not present | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | | |
| - GANSS Day | Set according to 4.2 | |
| - GANSS Day Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GANSS TOD | Set according to 4.2 | |
| - GANSS TOD Uncertainty | Set according to 4.2 | |
| - GANSS Time ID | 2 (GLONASS) | |
| - UTRAN GANSS reference time | Not present | |
| - $T_{UTRAN-GANSS}$ drift rate | Not present | |
| - UE positioning GANSS reference UE position | Not present | |
| - UE positioning GANSS ionospheric model | Not present | |
| - UE positioning GANSS additional ionospheric Model | Not present | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | 3 (GLONASS) | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Not present | |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Not present | |
| - UE positioning GANSS additional navigation models | Not present | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | Set according to 4.2 | |
| - GANSS Signal ID | Not present | |
| - Satellite Information | For satellites 1-6 | |
| - Extra Doppler | Set according to 4.2 | |
| - Azimuth and Elevation | Set according to 4.2 | |
| - Azimuth and Elevation LSB | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning GANSS almanac | Not present | |
| - UE positioning GANSS UTC model | Not present | |
| - UE positioning GANSS additional UTC models | Not present | |
| - UE positioning GANSS auxiliary information | Set according to 4.2 | |
| - GANSS-ID-3 | | |
| - Aux Info List | For satellites 1-6 | |

### 4.4.3.2 Sub-Test 2

MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | Not present | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | | |
| - GANSS Day | Set according to 4.2 | |
| - GANSS Day Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GANSS TOD | Set according to 4.2 | |
| - GANSS TOD Uncertainty | Set according to 4.2 | |
| - GANSS Time ID | Not present | |
| - UTRAN GANSS reference time | Not present | |
| - $T_{UTRAN-GANSS}$ drift rate | Not present | |
| - UE positioning GANSS reference UE position | Not present | |
| - UE positioning GANSS ionospheric model | Not present | |
| - UE positioning GANSS additional ionospheric Model | Not present | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | Not present | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Not present | |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Not present | |
| - UE positioning GANSS additional navigation models | Not present | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | Set according to 4.2 | |
| - GANSS Signal ID | Not present | |
| - Satellite Information | For satellites 1-M | |
| - Extra Doppler | Set according to 4.2 | |
| - Azimuth and Elevation | Set according to 4.2 | |
| - Azimuth and Elevation LSB | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning GANSS almanac | Not present | |
| - UE positioning GANSS UTC model | Not present | |
| - UE positioning GANSS additional UTC models | Not present | |
| - UE positioning GANSS auxiliary information | Not present | |

### 4.4.3.3 Sub-Test 3

MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark |
|---|---|
| **UE positioning GPS assistance data** | As defined in 4.3.3 |
| **UE positioning GANSS assistance data** | |
| - UE positioning GANSS reference time | Not present |
| - UE positioning GANSS reference UE position | Not present |
| - UE positioning GANSS ionospheric model | Not present |
| - UE positioning GANSS additional ionospheric Model | Not present |
| - UE positioning GANSS Earth orientation Parameters | Not present |
| - GANSS Generic Assistance Data | |
| - GANSS ID | 1 (Modernized GPS) |
| - UE positioning GANSS SBAS ID | Not present |
| - GANSS Time Models | Not present |
| - UE positioning DGANSS corrections | Not present |
| - UE positioning GANSS navigation model | Not present |
| - UE positioning GANSS additional navigation models | Not present |
| - UE positioning GANSS real-time integrity | Not present |
| - UE positioning GANSS data bit assistance | Not present |
| - UE positioning GANSS reference measurement information | Not present |
| - UE positioning GANSS almanac | Not present |
| - UE positioning GANSS UTC model | Not present |
| - UE positioning GANSS additional UTC models | Not present |
| - UE positioning GANSS auxiliary information | Set according to 4.2 |
| - GANSS-ID-1 | |
| - Aux Info List | For satellites 1-6 |

### 4.4.3.4 Sub-Test 4

MEASUREMENT CONTROL MESSAGE:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | As defined in 4.3.3 | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | Not present | |
| - UE positioning GANSS reference UE position | Not present | |
| - UE positioning GANSS ionospheric model | Not present | |
| - UE positioning GANSS additional ionospheric Model | Not present | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | 3 (GLONASS) | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Not present | |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Not present | |
| - UE positioning GANSS additional navigation models | Not present | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | | |
| - GANSS Signal ID | Not present | |
| - Satellite Information | For satellites 1-6 | |
| - Extra Doppler | Set according to 4.2 | |
| - Azimuth and Elevation | Set according to 4.2 | |
| - Azimuth and Elevation LSB | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning GANSS auxiliary information | Set according to 4.2 | |
| - GANSS-ID-3 | | |
| - Aux Info List | For satellites 1-6 | |

If the UE requests further assistance data, the SS sends subsequent MEASUREMENT CONTROL messages containing the assistance data fields requested by the UE that are available in the SS as specified in TS 37.571-5 clause 5.2.7 and in clause 4.4.5.

### 4.4.4 Inadequate assistance data for UE-assisted A-GNSS

For UE-assisted test cases requiring inadequate assistance data, the IEs "UE positioning GPS assistance data" and "UE positioning GANSS assistance data" are set to "Not present" in the MEASUREMENT CONTROL message.

### 4.4.5 Response to assistance data requests from UE

If the SS needs to send assistance data in response to a request for additional assistance data from the UE, or in response to an MO-LR request for assistance data, the IEs "UE positioning GPS assistance data" and "UE positioning GANSS assistance data" are set as follows:

| Information Element | Value/Remark | |
|---|---|---|
| **UE positioning GPS assistance data** | Set according to 4.3.5 | |
| - UE positioning GPS UTC model | Set according to 4.2 | |
| **UE positioning GANSS assistance data** | | |
| - UE positioning GANSS reference time | Set according to 4.2 | |
| - GANSS Day | Set according to 4.2 | |
| - GANSS Day Cycle Number | Set according to 4.2 | Rel-10 UE or later |
| - GANSS TOD | Set according to 4.2 | |
| - GANSS TOD Uncertainty | Set according to 4.2 | |
| - GANSS Time ID | Set according to 4.2 | |
| - UTRAN GANSS reference time | Not present | |
| - $T_{UTRAN-GANSS}$ drift rate | Not present | |
| - UE positioning GANSS reference UE position | Set according to 4.2 | |
| - UE positioning GANSS ionospheric model | Set according to 4.2 | |
| - UE positioning GANSS additional ionospheric Model | Set according to 4.2 | |
| - UE positioning GANSS Earth orientation Parameters | Not present | |
| - GANSS Generic Assistance Data | | |
| - GANSS ID | Set according to 4.2 | |
| - UE positioning GANSS SBAS ID | Not present | |
| - GANSS Time Models | Set according to 4.2 | |
| - GANSS Time Model | Set according to 4.2 | |
| - GANSS Time Model Reference Time | Set according to 4.2 | |
| - $T_{A0}$ | Set according to 4.2 | |
| - $T_{A1}$ | Not present | |
| - $T_{A2}$ | Not present | |
| - GNSS_TO_ID | Set according to 4.2 | |
| - Week Number | Not present | |
| - Delta_T | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning DGANSS corrections | Not present | |
| - UE positioning GANSS navigation model | Set according to 4.2 | |
| - UE positioning GANSS additional navigation models | Set according to 4.2 | |
| - UE positioning GANSS real-time integrity | Not present | |
| - UE positioning GANSS data bit assistance | Not present | |
| - UE positioning GANSS reference measurement information | Set according to 4.2 | |
| - GANSS Signal ID | Set according to 4.2 | |
| - Satellite Information | Set according to 4.2 | |
| - Extra Doppler | Set according to 4.2 | |
| - Azimuth and Elevation | Set according to 4.2 | |
| - Azimuth and Elevation LSB | Set according to 4.2 | Rel-10 UE or later |
| - UE positioning GANSS almanac | Set according to 4.2 | |
| - Complete Almanac Provided | True | Rel-10 UE or later |
| - UE positioning GANSS UTC model | Set according to 4.2 | |
| - UE positioning GANSS additional UTC models | Set according to 4.2 | |
| - UE positioning GANSS auxiliary information | Set according to 4.2 | |

If the UE requests the GPS navigation model or the GANSS navigation model Model-1, Model-2, or Model-3 then the SS provides navigation model satellite information for at most three satellites in any one MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY message; additional satellites are sent in subsequent MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY messages.

If the UE requests the GPS or GANSS almanac then the SS provides almanac information spread across at least two MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY messages.

If the UE requests both navigation model and almanac then the SS provides them in different MEASUREMENT CONTROL or ASSISTANCE DATA DELIVERY messages.

# 5 Default Conditions for E-UTRAN

## 5.1 LCS Sub-Test Cases

Some test cases defined in clause 7 may include several sub-test cases dependent on the positioning method(s) supported by the UE. Each sub-test case is identified by a sub-test case number as defined in Table 5.1-1. The applicable sub-tests for each test case are specified in the test procedure sequence clause of each test case. If no sub-tests are defined for a specific test case it means that this particular test case is not dependent on a specific positioning method.

**Table 5.1-1: Sub-Test Case Numbers for E-UTRA**

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |
| 5 | UE supporting OTDOA |
| 6 | UE supporting ECID |
| 7 | UE supporting GNSS(1) and OTDOA |
| NOTE: Any GNSS of GPS, GLONASS, Galileo (FFS) | |

## 5.2 Default signal conditions

### 5.2.1 Simulated GNSS environment

During A-GNSS signalling tests (Sub-tests 1-4, 7) the SS shall generate all UE supported satellite signals and shall provide assistance data dependent on UE capabilities defined in subclause 5.4.1.1. The levels of the simulated satellites shall be at -125 dBm ± 6 dBm.

GNSS scenarios together with associated assistance data are defined in TS 37.571-5 [12].

The accuracy of the GNSS time in the provided assistance data shall be within ± 2 seconds relative to the GNSS time in the system simulator.

### 5.2.2 Simulated OTDOA environment

For OTDOA signalling test cases a multi cell environment with Cell 1, Cell 2 and Cell 4 is used, as defined in 3GPP TS 36.508 [8].

All cells transmit PRS according to the PRS configuration provided in the OTDOA assistance data defined in subclause 5.4.1.2. The positioning subframes are low-interference subframes, i.e. contain no PDSCH transmissions.

Normal propagation condition is used for all cells. Cell 1 is the serving cell, and Cells 2 and 4 are neighbour cells.

The three Cells 1,2 and 4 shall be synchronized, and the timing offset (the RSTD) between the cells, referenced to the UE's antenna input, shall be set equal to the *expectedRSTD* value provided in the OTDOA assistance data, as defined in subclause 5.4.1.2.

The E-UTRA frequency to be tested and other default conditions are as specified for signalling test cases in 3GPP TS 36.508 [8].

### 5.2.3 Simulated ECID environment

For ECID signalling test cases a multi cell environment with Cell 1, Cell 2 and Cell 4 is used, as defined in 3GPP TS 36.508 [8].

Normal propagation condition is used for all cells. Cell 1 is the serving cell, and Cells 2 and 4 are neighbour cells.

The E-UTRA frequency to be tested and other default conditions are as specified for signalling test cases in 3GPP TS 36.508 [8].

NOTE: If the only ECID measurement supported by the UE is the UE Rx-Tx Time Difference Measurement, Cells 2 and 4 do not need to be simulated (see also table 5.4-6).

## 5.3 Default RRC and NAS message and information elements contents

The default values of common RRC and NAS messages and information elements are used as defined in 3GPP TS 36.508 [8] with the following exceptions.

## - ATTACH ACCEPT

**Table 5.3-1: ATTACH ACCEPT**

| Derivation Path: 24.301 clause 8.2.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| EPS network feature support | Set according to Table 5.3-2 | | |

**Table 5.3-2: EPS network feature support**

| Derivation Path: 24.301 clause 9.9.3.12A | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| IMS voice over PS session indicator (IMS VoPS) (octet 3, bit 1) | | | |
| Emergency bearer services indicator (EMC BS) (octet 3, bit 2) | | | |
| Location services indicator in EPC (EPC-LCS) (octet 3, bit 3) | 1 | location services via EPC supported | |
| Location services indicator in CS (CS-LCS) (octet 3, bit 4 to 5) | 01 | location services via CS domain not supported | |

## 5.4 Default LPP message and information elements contents

This clause contains the default values of LPP messages and information elements used, unless indicated otherwise in specific clauses of this specification.

- LPP REQUEST CAPABILITIES

**Table 5.4-1: RequestCapabilities**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| Initiator | locationServer | | |
| transactionNumber | (0..255) | | |
| } | | | |
| endTransaction | FALSE | | |
| sequenceNumber | Not present | | |
| acknowledgement | Not present | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| requestCapabilities SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| requestCapabilities-r9 SEQUENCE { | | | |
| commonIEsRequestCapabilities | Not present | | |
| a-gnss-RequestCapabilities SEQUENCE { | | | |
| gnss-SupportListReq | TRUE | | |
| assistanceDataSupportListReq | TRUE | | |
| locationVelocityTypesReq | TRUE | | |
| } | | | |
| otdoa-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| ecid-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| epdu-RequestCapabilities | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

- LPP PROVIDE ASSISTANCE DATA

**Table 5.4-2: ProvideAssistanceData**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | Dependent on test case. | | |
| initiator | | | |
| transactionNumber | | | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement | Not present | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData-r9 SEQUENCE { | | | |
| commonIEsProvideAssistanceData | Not present | | |
| a-gnss-ProvideAssistanceData SEQUENCE { | | | Sub-tests 1-4, and 7 only; and as defined in Table 5.4.1.1-1. |
| gnss-CommonAssistanceData SEQUENCE { | | | |
| gnss-ReferenceTime | As defined in Table 5.4.1.1-2 | | |
| gnss-ReferenceLocation | As defined in Table 5.4.1.1-3 | | |
| gnss-IonosphericModel | As defined in Table 5.4.1.1-4 | | |
| gnss-EarthOrientationParameters | Not present | | |
| } | | | |
| gnss-GenericAssistanceData(SIZE(1..2))OF{ | SIZE 1: Sub-tests 1,2,3<br>SIZE 2: Sub-test 4 | | |
| gnss-ID | Dependent on test case. | | |
| sbas-ID | Not present | | |
| gnss-TimeModels | As defined in Table 5.4.1.1-5 | | |
| gnss-DifferentialCorrections | Not present | | |
| gnss-NavigationModel | As defined in Table 5.4.1.1-6 | | |
| gnss-RealTimeIntegrity | Not present | | |
| gnss-DataBitAssistance | Not present | | |
| gnss-AcquisitionAssistance | As defined in Table 5.4.1.1-7 | | |
| gnss-Almanac | As defined in Table 5.4.1.1-8 | | |
| gnss-UTC-Model | As defined in Table 5.4.1.1-9 | | |
| gnss-AuxiliaryInformation | As defined in Table 5.4.1.1-10 | | |
| } | | | |
| gnss-Error | Not present | | |
| } | | | |
| otdoa-ProvideAssistanceData SEQUENCE { | | | Subtest 5 and 7 only |
| otdoa-ReferenceCellInfo | As defined in Table 5.4.1.2-1 | | |
| otdoa-NeighbourCellInfo | As defined in Table 5.4.1.2-2 | | |
| otdoa-Error | Not present | | |
| } | | | |

| | | | |
|---|---|---|---|
| epdu-ProvideAssistanceData | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

- LPP REQUEST LOCATION INFORMATION

**Table 5.4-3: RequestLocationInformation**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | | |
| } | | | |
| endTransaction | FALSE | | |
| sequenceNumber | Not present | | |
| acknowledgement | Not present | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| requestLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| requestLocationInformation-r9 SEQUENCE { | | | |
| commonIEsRequestLocationInformation SEQUENCE { | | | |
| locationInformationType | Dependent on test case | | |
| triggeredReporting | Not present | | |
| periodicalReporting | Not present | | |
| additionalInformation | onlyReturnInformationRequested | | |
| qos SEQUENCE { | | | |
| horizontalAccuracy | Not present | | |
| verticalCoordinateRequest | FALSE | | |
| verticalAccuracy | Not present | | |
| responseTime | 32 | | |
| velocityRequest | FALSE | | |
| } | | | |
| environment | Not present | | |
| locationCoordinateTypes | Not present | | |
| velocityTypes | Not present | | |
| } | | | |
| a-gnss-RequestLocationInformation | As defined in Table 5.4-4 | | Sub-tests 1-4 and 7 |
| otdoa-RequestLocationInformation | As defined in Table 5.4-5 | | Sub-test 5 and 7 |
| ecid-RequestLocationInformation | As defined in Table 5.4-6 | | Sub-test 6 |
| epdu-RequestLocationInformation | Not Present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

- A-GNSS REQUEST LOCATION INFORMATION

**Table 5.4-4: A-GNSS-RequestLocationInformation**

| Derivation Path: 36.355 clause 6.5.2.7 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| A-GNSS-RequestLocationInformation ::= SEQUENCE { | | | |
| gnss-PositioningInstructions SEQUENCE { | | | |
| gnss-Methods SEQUENCE { | | | |
| gnss-ids | Sub-test 1: bit 0 = 1<br>Sub-test 2: bit 4 = 1<br>Sub-test 3: bit 3 = 1<br>Sub-test 4: bits 0 & 4 = 1<br>Sub-test 7: any (FFS) | | |
| } | | | |
| fineTimeAssistanceMeasReq | FALSE | | |
| adrMeasReq | FALSE | | |
| multiFreqMeasReq | FALSE | | |
| assistanceAvailability | FALSE | | |
| } | | | |
| } | | | |

- OTDOA REQUEST LOCATION INFORMATION

**Table 5.4-5: OTDOA-RequestLocationInformation**

| Derivation Path: 36.355 clause 6.5.1.6 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| OTDOA-RequestLocationInformation ::= SEQUENCE { | | | |
| assistanceAvailability | FALSE | | |
| } | | | |

- ECID REQUEST LOCATION INFORMATION

**Table 5.4-6: ECID-RequestLocationInformation**

| Derivation Path: 36.355 clause 6.5.1.6 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ECID-RequestLocationInformation ::= SEQUENCE { | | | |
| requestedMeasurements | All measurements supported by the UE | | |
| } | | | |

## 5.4.1 Default assistance data information elements

### 5.4.1.1 GNSS Assistance Data Elements

Table 5.4.1.1-1 defines the GNSS assistance data elements which shall be provided to the UE in the tests in LPP Provide Assistance Data messages in absence of a corresponding LPP Request Assistance Data message. The GNSS assistance data provided depends on the mode being used in the test case, the assistance data supported by the UE and the GNSSs supported by the UE. GNSS assistance data IEs not supported by the UE shall not be sent. GNSS assistance data IEs supported by the UE but not listed in Table 5.4.1.1-1 shall not be sent.

**Table 5.4.1.1-1: GNSS assistance data to be provided to the UE**

| GNSS Assistance Data IE supported by UE | Mode used in test case | | |
|---|---|---|---|
| | UE-based | UE-assisted, GNSS-AcquisitionAssistance supported by UE | UE-assisted, GNSS-AcquisitionAssistance not supported by UE |
| GNSS-Reference Time | Yes | Yes | Yes |
| GNSS-ReferenceLocation | Yes | No | Yes |
| GNSS-IonosphericModel | Yes | No | No |
| GNSS-TimeModelList | Yes(1) | No | Yes(1) |
| GNSS-NavigationModel | Yes | No | Yes |
| GNSS-AcquisitionAssistance | No | Yes | No |
| GNSS-Almanac | No | No | Yes |
| GNSS-UTC-Model | Yes(1) | No | No |
| GNSS-AuxiliaryInformation | Yes(2) | Yes(2) | Yes(2) |
| NOTE 1: Sub-test 4 only.<br>NOTE 2: Sub-tests 2 and 4, and if UE supports multiple signals per GNSS only. | | | |

- GNSS REFERENCE TIME

**Table 5.4.1.1-2: GNSS-ReferenceTime**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-ReferenceTime ::= SEQUENCE { | | | |
| gnss-SystemTime SEQUENCE { | | | |
| gnss-TimeID | Sub-test 1: gps (0)<br>Sub-test 2: glonass (4)<br>Sub-test 3: galileo (3)<br>Sub-test 4: gps (0) | | |
| gnss-DayNumber | As defined in 37.571-5 [12] | | |
| gnss-TimeOfDay | As defined in 37.571-5 [12] | | |
| gnss-TimeOfDayFrac-msec | Not present | | |
| notificationOfLeapSecond | As defined in 37.571-5 [12] | | Sub-test 2 only |
| gps-TOW-Assist | As defined in 37.571-5 [12] | | Sub-tests 1 and 4 only |
| } | | | |
| referenceTimeUnc | 116 | 1.9950 seconds | |
| gnss-ReferenceTimeForCells | Not present | | |
| } | | | |

- GNSS REFERENCE LOCATION

**Table 5.4.1.1-3: GNSS-ReferenceLocation**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-ReferenceLocation ::= SEQUENCE { | | | |
| threeDlocation | As defined in 37.571-5 [12] | | |
| } | | | |

- GNSS IONOSPHERIC MODEL

**Table 5.4.1.1-4: GNSS-IonosphericModel**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-IonospericModel ::= SEQUENCE { | | | |
| klobucharModel | As defined in 37.571-5 [12] | | Sub-tests 1 and 4 |
| neQuickModel | As defined in 37.571-5 [12] | | Sub-test 3 |
| } | | | |

- GNSS TIME MODEL

**Table 5.4.1.1-5: GNSS-TimeModelList**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-TimeModelList ::= SEQUENCE (SIZE (1)) OF { | | | |
| gnss-TimeModelRefTime | As defined in 37.571-5 [12] | | |
| tA0 | As defined in 37.571-5 [12] | | |
| tA1 | As defined in 37.571-5 [12] | | |
| tA2 | As defined in 37.571-5 [12] | | |
| gnss-TO-ID | 4 | GLONASS | Sub-test 4 |
| weekNumber | As defined in 37.571-5 [12] | | |
| deltaT | As defined in 37.571-5 [12] | | |
| } | | | |

- GNSS NAVIGATION MODEL

**Table 5.4.1.1-6: GNSS-NavigationModel**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-NavigationModel ::= SEQUENCE { | | | |
| nonBroadcastFlag | 0 | | |
| gnss-SatelliteList SEQUENCE (SIZE(1..64)) OF { | SIZE defined in 37.571-5 [12] | | |
| svID | As defined in 37.571-5 [12] | | |
| svHealth | As defined in 37.571-5 [12] | | |
| iod | As defined in 37.571-5 [12] | | |
| gnss-ClockModel CHOICE { | | | |
| standardClockModelList | As defined in 37.571-5 [12] | | Sub-test 3 |
| nav-ClockModel | As defined in 37.571-5 [12] | | Sub-tests 1,4 |
| cnav-ClockModel | As defined in 37.571-5 [12] | | |
| glonass-ClockModel | As defined in 37.571-5 [12] | | Sub-tests 2,4 |
| sbas-ClockModel | As defined in 37.571-5 [12] | | |
| } | | | |
| gnss-OrbitModel CHOICE { | | | |
| keplerianSet | As defined in 37.571-5 [12] | | Sub-test 3 |
| nav-KeplerianSet | As defined in 37.571-5 [12] | | Sub-tests 1,4 |
| cnav-KeplerianSet | As defined in 37.571-5 [12] | | |
| glonass-ECEF | As defined in 37.571-5 [12] | | Sub-tests 2,4 |
| sbas-ECEF | As defined in 37.571-5 [12] | | |
| } | | | |
| } | | | |
| } | | | |

- GNSS ACQUISITION ASSISTANCE

**Table 5.4.1.1-7: GNSS-AcquisitionAssistance**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-AcquisitionAssistance ::= SEQUENCE { | | | |
| gnss-SignalID | As defined in 37.571-5 [12] | | |
| gnss-AcquisitionAssistList (SIZE(1..64)) OF { | SIZE defined in 37.571-5 [12] | | |
| svID | As defined in 37.571-5 [12] | | |
| doppler0 | As defined in 37.571-5 [12] | | |
| doppler1 | As defined in 37.571-5 [12] | | |
| dopplerUncertainty | As defined in 37.571-5 [12] | | |
| codePhase | As defined in 37.571-5 [12] | | |
| intCodePhase | As defined in 37.571-5 [12] | | |
| codePhaseSearchWindow | As defined in 37.571-5 [12] | | |
| azimuth | As defined in 37.571-5 [12] | | |
| elevation | As defined in 37.571-5 [12] | | |
| codePhase1023 | As defined in 37.571-5 [12] | | |
| } | | | |
| } | | | |

- GNSS ALMANAC

**Table 5.4.1.1-8: *GNSS-Almanac***

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-Almanac ::= SEQUENCE { | | | |
| weekNumber | As defined in 37.571-5 [12] | | |
| toa | As defined in 37.571-5 [12] | | |
| ioda | As defined in 37.571-5 [12] | | |
| completeAlmanacProvided | TRUE | | |
| gnss-AlmanacList (SIZE(1..64)) OF CHOICE { | SIZE defined in 37.571-5 [12] | | |
| keplerianAlmanacSet | As defined in 37.571-5 [12] | | Sub-test 3 |
| keplerianNAV-Almanac | As defined in 37.571-5 [12] | | Sub-tests 1,4 |
| keplerianReducedAlmanac | As defined in 37.571-5 [12] | | |
| keplerianMidiAlmanac | As defined in 37.571-5 [12] | | |
| keplerianGLONASS | As defined in 37.571-5 [12] | | Sub-test 2, 4 |
| ecef-SBAS-Almanac | As defined in 37.571-5 [12] | | |
| } | | | |
| } | | | |

- GNSS UTC MODEL

**Table 5.4.1.1-9: *GNSS-UTC-Model***

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-UTC-Model ::= CHOICE { | | | |
| utcModel1 | As defined in 37.571-5 [12] | | Sub-test 1, 3, 4 |
| utcModel2 | As defined in 37.571-5 [12] | | |
| utcModel3 | As defined in 37.571-5 [12] | | Sub-test 2, 4 |
| utcModel4 | As defined in 37.571-5 [12] | | |
| } | | | |

- GNSS AUXILIARY INFORMATION

**Table 5.4.1.1-10: GNSS-AuxiliaryInformation**

| Derivation Path: 36.355 clause 6.5.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| GNSS-AuxiliaryInformation ::= CHOICE { | | | |
| gnss-ID-GPS | As defined in 37.571-5 [12] | | Sub-test 1, 4 |
| gnss-ID-GLONASS | As defined in 37.571-5 [12] | | Sub-test 2, 4 |
| } | | | |

## 5.4.1.2 OTDOA Assistance Data Elements

This subclause defines the OTDOA assistance data elements which shall be provided to the UE in the tests in LPP Provide Assistance Data messages.

- OTDOA REFERENCE CELL INFO

**Table 5.4.1.2-1: OTDOA-ReferenceCellInfo**

| Derivation Path: 36.355 clause 6.5.1.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| OTDOA-ReferenceCellInfo ::= SEQUENCE { | | Cell 1 | |
| physCellId | 0 | | |
| cellGlobalId | '0000 0000'B | | |
| earfcnRef | Not present | Same as the serving cell | |
| antennaPortConfig | Not present | Same as the serving cell | |
| cpLength | Normal | | |
| prsInfo SEQUENCE { | | | |
| prs-Bandwidth | PRS are transmitted over the used system bandwidth (see subclause 5.2.2) | | |
| prs-ConfigurationIndex | 2 | | |
| numDL-Frames | sf-1 | | |
| prs-MutingInfo-r9 | Not present | PRS muting is not used. | |
| } | | | |
| } | | | |

- OTDOA NEIGHBOUR CELL INFO LIST

**Table 5.4.1.2-2: OTDOA-NeighbourCellInfoList**

| Derivation Path: 36.355 clause 6.5.1.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| OTDOA-NeighbourCellInfoList ::= SEQUENCE (SIZE(1)) OF SEQUENCE { | | | |
| SEQUENCE (SIZE(2)) OF SEQUENCE { | | Cell 2 | |
| physCellId | 2 | | |
| cellGlobalId | '0000 0010'B | | |
| earfcn | Not present | Same as for the reference cell | |
| cpLength | Not present | Same as for the reference cell | |
| prsInfo | Not present | Same as for the reference cell | |
| antennaPortConfig | Not present | Same as for the reference cell | |
| slotNumberOffset | Not present | Slot timing is the same as for reference cell | |
| prs-SubframeOffset | Not present | | |
| expectedRSTD | 8192 | Value 0 | |
| expectedRSTD-Uncertainty | 10 | About 1 µs | |
| } | | | |
| SEQUENCE { | | Cell 4 | |
| physCellId | 4 | | |
| cellGlobalId | '0000 0100'B | | |
| earfcn | Not present | Same as for the reference cell | |
| cpLength | Not present | Same as for the reference cell | |
| prsInfo | Not present | Same as for the reference cell | |
| antennaPortConfig | Not present | Same as for the reference cell | |
| slotNumberOffset | Not present | Slot timing is the same as for reference cell | |
| prs-SubframeOffset | Not present | | |
| expectedRSTD | 8192 | Value 0 | |
| expectedRSTD-Uncertainty | 10 | About 1 µs | |
| } | | | |
| } | | | |
| } | | | |

# 6 Protocol Conformance Test Cases for UTRAN

## 6.1 Assisted-GPS Test Cases

### 6.1.1 Assisted GPS Network Induced Tests

#### 6.1.1.1 LCS Network Induced location request/ UE-Based GPS/ Emergency Call / with USIM

##### 6.1.1.1.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.1.1.2 Conformance requirements

1) A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call.

   When a user requests an emergency call establishment the UE will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment.

2) Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the UE sends a setup message to its peer entity. This setup message is

   - a SETUP message, if the call to be established is a basic call; and
   - an EMERGENCY SETUP message, if the call to be established is an emergency call.

3) If the IE "UE positioning GPS reference time" is included, the UE shall:

   1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

   1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

   NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

4) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

   1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

   1> use it as a priori knowledge of the approximate location of the UE.

5) The UE shall when a measurement report is triggered:

   2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

      3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

         4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

         4> if the IE "GPS timing of Cell wanted" is set to FALSE:

            5> include the IE "GPS TOW msec".

         4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

            5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

               6> if the UE has been able to calculate a 3-dimensional position:

                  7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

               6> if the UE has not been able to calculate a 3-dimensional position:

                  7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

         4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

            5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

Reference(s):

- Conformance requirement 1: TS 24.008 clause 4.5.1.5.
- Conformance requirement 2: TS 24.008, clause 5.2.1.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.3.7.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.3.8.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.1b.

#### 6.1.1.1.3 Test Purpose

To verify when an emergency call is initiated by a UE with a USIM, and the network performs a location request using the RRC measurement control procedure by sending Measurement Control message , then the UE respond with a Measurement Report containing UE location.

#### 6.1.1.1.4 Method of Test

Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2.
- User Equipment:
  - the UE is in state "MM idle" with valid TMSI and CKSN.

Related PICS/PIXIT Statements

- Emergency speech call yes/no
- UE Based Network Assisted GPS

Test procedure

The UE is made to initiate an emergency call.

After the call has been through-connected in both directions, the SS orders an A-GPS positioning measurement using two MEASUREMENT CONTROL messages. The last MEASUREMENT CONTROL message orders periodical reporting by sending a MEASUREMENT CONTROL message requesting periodical measurement reporting (1 report, interval 64s).

The UE then performs positioning measurements, calculates "UE Positioning Position Estimate Info" and responds with this in the RRC message MEASUREMENT REPORT.

Finally the SS clears the call.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | UE | | | The "emergency number" is entered. Number shall be one programmed in test USIM $EF_{ECC}$ (Emergency Call Codes), ref. 34.108 clause 8.3.2.21. |
| 2 | --> | | | UE establishes RRC procedure for emergency call.<br>Establishment cause: Emergency Call<br>SS checks that the UE capability includes A-GPS UE based positioning measurement |
| 3 | --> | | CM SERVICE REQUEST | The CM service type IE indicates "emergency call establishment". |
| 4 | <-- | | AUTHENTICATION REQUEST | IE Authentication Parameter AUTN shall be present in the message. |
| 5 | --> | | AUTHENTICATION RESPONSE | SRES specifies correct value. |
| 6 | | | | SS starts security procedure. |
| 7 | --> | | EMERGENCY SETUP | If the Bearer capability IE is not included the default UMTS AMR speech version shall be assumed. |
| 8 | <-- | | CALL PROCEEDING | |
| 9 | <-- | | ALERTING | |
| 10 | <-- | | | SS sets up the radio bearer with the rate indicated by the EMERGENCY SETUP message. |
| 11 | <-- | | CONNECT | |
| 12 | --> | | CONNECT ACKNOWLEDGE | |
| 13 | UE | | | The DTCH is through connected in both directions. |
| 14 | <- | | MEASUREMENT CONTROL | |
| 15 | <- | | MEASUREMENT CONTROL | |
| 16 | --> | | MEASUREMENT REPORT | |
| 17 | <-- | | DISCONNECT | SS disconnects the call and associated radio bearer. |

Specific Message Contents

MEASUREMENT CONTROL (Step 14):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 15):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 16):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | GPS reference time only |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

#### 6.1.1.1.5 Test requirements

After step 12 the UE shall have through connected the DTCH in both directions.

After step 15 the UE shall respond with a MEASUREMENT REPORT message.

### 6.1.1.2 LCS Network Induced location request/ UE-Based GPS/ Emergency Call / without USIM

#### 6.1.1.2.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.1.2.2 Conformance requirements

1) A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call.

   When a user requests an emergency call establishment the UE will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment.

   Normally, the UE will be identified by an IMSI or a TMSI. However, if none of these identifiers is available in the UE, then the UE shall use the IMEI for identification purposes.

2) As a serving network option, emergency calls may be established without the network having to apply the security mode procedure as defined in TS 24.008.

   The following are the only cases where the "security procedure not applied" option may be used:

   a) Authentication is impossible because the USIM is absent.

3) Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the UE sends a setup message to its peer entity. This setup message is

   - a SETUP message, if the call to be established is a basic call; and
   - an EMERGENCY SETUP message, if the call to be established is an emergency call.

4) If the IE "UE positioning GPS reference time" is included, the UE shall:

   1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

   1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

   NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

5) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

   1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

   1> use it as a priori knowledge of the approximate location of the UE.

6) The UE shall when a measurement report is triggered:

   2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

      3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

         4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

         4> if the IE "GPS timing of Cell wanted" is set to FALSE:

            5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

Reference(s):

- Conformance requirement 1: TS 24.008 clause 4.5.1.5, TS 22.101 clause 8.
- Conformance requirement 2: TS 33.102, clause 6.4.9.2.
- Conformance requirement 3: TS 24.008, clause 5.2.1.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.3.7.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.3.8.
- Conformance requirement 6: TS 25.331, clause 8.6.7.19.1b.

#### 6.1.1.2.3 Test Purpose

To verify when an emergency call is initiated by a UE in the "MM idle, no IMSI" state (no USIM inserted) and the network performs a location request using the RRC measurement control procedure by sending Measurement Control message , then the UE respond with a Measurement Report containing UE location.

#### 6.1.1.2.4 Method of Test

Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment:
  - the UE is in MM-state "MM idle, no IMSI", no USIM inserted.

Related PICS/PIXIT Statements

- Emergency speech call yes/no
- UE Based Network Assisted GPS

Test procedure

The UE is made to initiate an emergency call.

After the call has been through-connected in both directions, the SS orders an A-GPS positioning measurement using two MEASUREMENT CONTROL messages. The last MEASUREMENT CONTROL message orders periodical reporting by sending a MEASUREMENT CONTROL message requesting periodical measurement reporting (1 report, interval 64s).

The UE then performs positioning measurements, calculates "UE Positioning Position Estimate Info" and responds with this in the RRC message MEASUREMENT REPORT.

Finally the SS clears the call.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | UE | | | The "emergency number" is entered. One of the following emergency numbers shall be used: 000, 08, 112, 110, 118, 119, 911 or 999. |
| 2 | --> | | | UE establishes RRC procedure for emergency call.<br>Establishment cause: Emergency Call<br>SS checks that the UE capability includes A-GPS UE based positioning measurement |
| 3 | --> | | CM SERVICE REQUEST | The CM service type IE indicates "emergency call establishment". |
| 4 | <-- | | CM SERVICE ACCEPT | |
| 5 | --> | | EMERGENCY SETUP | If the Bearer capability IE is not included the default UMTS AMR speech version shall be assumed. |
| 6 | <-- | | CALL PROCEEDING | |
| 7 | <-- | | ALERTING | |
| 8 | <-- | | | SS sets up the radio bearer with the rate indicated by the EMERGENCY SETUP message. |
| 9 | <-- | | CONNECT | |
| 10 | --> | | CONNECT ACKNOWLEDGE | |
| 11 | UE | | | The DTCH is through connected in both directions. |
| 12 | <- | | MEASUREMENT CONTROL | |
| 13 | <- | | MEASUREMENT CONTROL | |
| 14 | --> | | MEASUREMENT REPORT | |
| 15 | <-- | | DISCONNECT | SS disconnects the call and associated radio bearer. |

Specific Message Contents

MEASUREMENT CONTROL (Step 12):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 13):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 14):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | GPS reference time only |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

6.1.1.2.5 Test requirements

After step 10 the UE shall have through connected the DTCH in both directions.

After step 13 the UE shall respond with a MEASUREMENT REPORT message containing a position estimate.

### 6.1.1.3 LCS Network induced location request/ UE-Assisted GPS/ Emergency call/ With USIM

#### 6.1.1.3.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities.

#### 6.1.1.3.2 Conformance requirements

1) A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call.

   When a user requests an emergency call establishment the UE will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment.

2) Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the UE sends a setup message to its peer entity. This setup message is

   - a SETUP message, if the call to be established is a basic call; and
   - an EMERGENCY SETUP message, if the call to be established is an emergency call.

3) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

4) The UE shall:

1> when a measurement report is triggered:

   2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

      3> if the IE "Vertical Accuracy" is included:

         4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

      3> if the IE "Positioning Methods" is set to "GPS":

         4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

            5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

               6> if the IE "GPS timing of Cell wanted" is set to TRUE:

                  7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

                  7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

                  7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

               6> if the IE "GPS timing of Cell wanted" is set to FALSE:

7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

References

- Conformance requirement 1: TS 24.008 clause 4.5.1.5.
- Conformance requirement 2: TS 24.008, clause 5.2.1.
- Conformance requirement 3: TS 25.331, clause 8.4.1.3.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.1a.

#### 6.1.1.3.3 Test Purpose

To verify when an emergency call is initiated by a UE with a USIM, and the network performs a location request using the RRC measurement control procedure by sending Measurement Control message , then the UE respond with a Measurement Report containing "UE positioning GPS measured results".

#### 6.1.1.3.4 Method of Test

Initial Conditions

System Simulator (SS):

1 cell, default parameters

Satellites: As specified in 4.2

UE:

- the UE is in state "MM idle" with valid TMSI and CKSN.

Related PICS/PIXIT Statements

- Emergency speech call yes/no
- UE Assisted Network Assisted GPS

Test Procedure

The UE is made to initiate an emergency call.

After the call has been through-connected in both directions, the SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE then performs positioning measurements and responds with the RRC message MEASUREMENT REPORT.

Finally the SS clears the call.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | UE | | | The "emergency number" is entered. Number shall be one programmed in test USIM $EF_{ECC}$ (Emergency Call Codes), ref. 34.108 clause 8.3.2.21. |
| 2 | --> | | | UE establishes RRC procedure for emergency call.<br>Establishment cause: Emergency Call<br>SS checks that the UE capability includes A-GPS UE assisted positioning measurement |
| 3 | --> | | CM SERVICE REQUEST | The CM service type IE indicates "emergency call establishment". |
| 4 | <-- | | AUTHENTICATION REQUEST | IE Authentication Parameter AUTN shall be present in the message. |
| 5 | --> | | AUTHENTICATION RESPONSE | SRES specifies correct value. |
| 6 | SS | | | SS starts security procedure. |
| 7 | --> | | EMERGENCY SETUP | If the Bearer capability IE is not included the default UMTS AMR speech version shall be assumed. |
| 8 | <-- | | CALL PROCEEDING | |
| 9 | <-- | | ALERTING | |
| 10 | <-- | | | SS sets up the radio bearer with the rate indicated by the EMERGENCY SETUP message. |
| 11 | <-- | | CONNECT | |
| 12 | --> | | CONNECT ACKNOWLEDGE | |
| 13 | UE | | | The DTCH is through connected in both directions. |
| 14 | <- | | MEASUREMENT CONTROL | |
| 15 | --> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 15a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 15, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 15b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 15, this message contains the IE "UE positioning GPS measured results". |
| 16 | <-- | | DISCONNECT | SS disconnects the call and associated radio bearer. |

Specific Message Contents

MEASUREMENT CONTROL (Step 14):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 15 (Option 1) or 15b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 15 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 15a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | Set according to 4.2 (unequal to 0) |
| - Vertical accuracy | Set according to 4.2 (unequal to 0) |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

6.1.1.3.5 Test requirements

After step 12 the UE shall have through connected the DTCH in both directions.

After step 14 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

### 6.1.1.4 LCS Network induced location request/ UE-Assisted GPS/ Emergency call/ Without USIM

#### 6.1.1.4.1 Definition

This test case applies to all UEs supporting UE-assisted A-GPS Location Service capabilities.

#### 6.1.1.4.2 Conformance requirements

1) A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call.

   When a user requests an emergency call establishment the UE will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment.

   Normally, the UE will be identified by an IMSI or a TMSI. However, if none of these identifiers is available in the UE, then the UE shall use the IMEI for identification purposes.

2) As a serving network option, emergency calls may be established without the network having to apply the security mode procedure as defined in TS 24.008.

   The following are the only cases where the "security procedure not applied" option may be used:

a) Authentication is impossible because the USIM is absent.

3) Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the UE sends a setup message to its peer entity. This setup message is

   - a SETUP message, if the call to be established is a basic call; and
   - an EMERGENCY SETUP message, if the call to be established is an emergency call.

4) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

5) The UE shall:

1> when a measurement report is triggered:

   2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

      3> if the IE "Vertical Accuracy" is included:

         4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

      3> if the IE "Positioning Methods" is set to "GPS":

4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

6> if the IE "GPS timing of Cell wanted" is set to TRUE:

7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

6> if the IE "GPS timing of Cell wanted" is set to FALSE:

7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

References

- Conformance requirement 1: TS 24.008 clause 4.5.1.5, TS 22.101 clause 8.
- Conformance requirement 2: TS 33.102, clause 6.4.9.2.
- Conformance requirement 3: TS 24.008, clause 5.2.1.
- Conformance requirement 4: TS 25.331, clause 8.4.1.3.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.1a.

#### 6.1.1.4.3 Test Purpose

To verify that when an emergency call is initiated by a UE with no USIM, and the network performs a network-induced location request using UE-assisted A-GPS, the UE responds with a Measurement Report containing the IE "UE positioning GPS measured results".

#### 6.1.1.4.4 Method of Test

Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment:
  - the UE is in state "MM idle" with no IMSI and no USIM inserted.

Related PICS/PIXIT Statements

- Emergency speech call yes/no
- UE Assisted Network Assisted GPS

Test procedure

The UE is made to initiate an emergency call. The call is established without authentication and security.

After the call has been through-connected in both directions, the SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message including the IE "UE positioning GPS measured results".

Finally the SS clears the call.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | UE | | | The "emergency number" is entered. One of the following emergency numbers shall be used: 000, 08, 112, 110, 118, 119, 911 or 999. |
| 2 | --> | | | UE establishes RRC procedure for emergency call.<br>Establishment cause: Emergency Call<br>SS checks that the UE capability includes A-GPS UE-assisted positioning measurement. |
| 3 | --> | | CM SERVICE REQUEST | The CM service type IE indicates "emergency call establishment". The mobile identity IE specifies the IMEI of the UE. The cipher key sequence number IE indicates "no key is available". |
| 4 | <-- | | CM SERVICE ACCEPT | |
| 5 | --> | | EMERGENCY SETUP | If the Bearer capability IE is not included the default UMTS AMR speech version shall be assumed. |
| 6 | <-- | | CALL PROCEEDING | |
| 7 | <-- | | ALERTING | |
| 8 | <-- | | | SS sets up the radio bearer with the rate indicated by the EMERGENCY SETUP message. |
| 9 | <-- | | CONNECT | |
| 10 | --> | | CONNECT ACKNOWLEDGE | |
| 11 | UE | | | The DTCH is through connected in both directions. |
| 12 | <- | | MEASUREMENT CONTROL | Assistance data as specified in subclause 4.3.3. |
| 13 | --> | | MEASUREMENT REPORT | UE reports the IE "UE positioning GPS measured results" (Option 1) or requests additional assistance data (Option 2). |
| 13a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 13, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 13b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 13, this message contains the IE "UE positioning GPS measured results". |
| 14 | <-- | | DISCONNECT | SS disconnects the call and associated radio bearer. |

Specific Message Contents

MEASUREMENT CONTROL (Step 12):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in subclause 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 13 (Option 1) or 13b (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 13 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 13a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | Set according to 4.2 (unequal to 0) |
| - Vertical accuracy | Set according to 4.2 (unequal to 0) |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

#### 6.1.1.4.5 Test requirements

After step 10 the UE shall have through connected the DTCH in both directions.

After step 12 the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

## 6.1.2 Assisted GPS Mobile Originated Tests

### 6.1.2.1 LCS Mobile originated location request/ UE-Based GPS/ Position estimate request/ Success

#### 6.1.2.1.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities and providing a method to trigger an MO-LR request for a position estimate.

#### 6.1.2.1.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

3) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

   1> if an update has been provided for this satellite:

      2> act as specified in subclause 8.6.7.19.3.4.

   If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

   1> update the variable UE_POSITIONING_GPS_DATA as follows:

      2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

   1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

4) The UE shall when a measurement report is triggered:

   2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

4> if the IE "GPS timing of Cell wanted" is set to FALSE:

5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

5) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

6) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 5 and 6: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 25.331, subclause 8.4.1.3.
- Conformance requirement 3: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 4: TS 25.331, subclause 8.6.7.19.1b
- Reference [12] in these conformance requirements denotes document ICD-GPS-200: "Navstar GPS Space Segment/Navigation User Interface".

#### 6.1.2.1.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted UE-based GPS.

#### 6.1.2.1.4 Method of Test

Initial Conditions

- System Simulator:

- 1 cell, default parameters.
- Satellites: As specified in 4.2

- User Equipment:
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- Method of triggering an MO-LR request for a position estimate.

### Test Procedure

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

Then the UE invokes an MO-LR request of type "locationEstimate". The SS orders an A-GPS positioning measurement using two MEASUREMENT CONTROL messages, including assistance data. The UE then initiates periodic measurement reporting. After the first received MEASUREMENT REPORT message, the SS responds with a FACILITY message containing an MO-LR result. When UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

### Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "locationEstimate". |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | <- | | MEASUREMENT CONTROL | |
| 9 | -> | | MEASUREMENT REPORT | |
| 10 | <- | | FACILITY | LCS MO-LR result message containing location estimate |
| 11 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 12 | SS | | | The SS releases the RRC connection and the test case ends. |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->locationEstimate |
| SS version indicator | Value 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | Set according to 4.2 (unequal to 0) |
| - Vertical accuracy | Set according to 4.2 (unequal to 0) |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 9)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

FACILITY (Step 10)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | FACILITY (0011 1010) |
| Facility | Return result = LCS-MOLR<br>LCS-MOLRRes -> locationEstimate |

RELEASE COMPLETE (Step 11)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |

#### 6.1.2.1.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate".

After step 8, the UE shall respond with a MEASUREMENT REPORT message.

After step 10, the UE shall send a RELEASE COMPLETE message.

### 6.1.2.2 LCS Mobile originated location request/ UE-Based or UE-Assisted GPS/ Assistance data request/ Success

#### 6.1.2.2.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GPS Location Service capabilities and providing a method to trigger an MO-LR request for assistance data.

#### 6.1.2.2.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

3) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 2 and 3: TS 24.030, subclause 5.1.1

#### 6.1.2.2.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted network assisted GPS.

#### 6.1.2.2.4 Method of Test

Initial Conditions

- System Simulator:

- 1 cell, default parameters.
- Satellites: As specified in 4.2

- User Equipment:
  - The UE shall begin the test with no GPS assistance data stored.
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- UE Assisted Network Assisted GPS
- Method of clearing stored GPS assistance data
- Method of triggering an MO-LR request for assistance data.

### Test Procedure

The stored GPS assistance data in the UE shall be cleared.

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

Then the UE invokes an MO-LR request of type "assistanceData".

The SS transmits an ASSISTANCE DATA delivery message with assistance data. When the assistance data delivery was successful, the SS sends a FACILITY message to the UE.

The UE clears the transaction by sending a RELEASE COMPLETE message.

### Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | | | Void | |
| 2 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 3 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 4 | <- | | AUTHENTICATION REQUEST | |
| 5 | -> | | AUTHENTICATION RESPONSE | |
| 6 | SS | | | The SS starts ciphering and integrity protection. |
| 7 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "assistanceData". |
| 8 | <- | | ASSISTANCE DATA DELIVERY | The SS provides the requested data in one or more ASSISTANCE DATA DELIVERY messages as specified in subclause 4.3.5 |
| 9 | <- | | FACILITY | |
| 10 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 11 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 7)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator<br>Transaction identifier<br>Message type<br>Facility<br><br><br><br><br><br><br><br><br><br>SS version indicator | Call Independent SS message (1011)<br><br>REGISTER (xx11 1011)<br>Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->assistanceData<br>locationMethod -> assistedGPS<br>gpsAssistanceData -> OCTET STRING<br>Octets 1 to 38 are coded in the same way as octets 3 to 7+2n of Requested GPS Data IE in 3GPP TS 49.031 (Contents are not verified, SS will use octet 1 to identify the GPS assistance data requested by the MS)<br><br>Value 1 or above |

ASSISTANCE DATA DELIVERY (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| UE positioning OTDOA assistance data for UE-based | Not present |
| UE positioning GPS assistance data | Set as specified in 4.3.5. |

FACILITY (Step 9)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator<br>Transaction identifier<br>Message type<br>Facility | Call Independent SS message (1011)<br><br>FACILITY (0011 1010)<br>Return result = LCS-MOLR<br>LCS-MOLRRes -> EMPTY |

RELEASE COMPLETE (Step 10)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator<br>Transaction identifier<br>Message type | Call Independent SS message (1011)<br><br>RELEASE COMPLETE (0x10 1010) |

#### 6.1.2.2.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "assistanceData".

After step 8, the UE shall send a RELEASE COMPLETE message.

### 6.1.2.3 LCS Mobile originated location request/ UE-Assisted GPS/ Position Estimate/ Success

#### 6.1.2.3.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities and providing a method to trigger an MO-LR request for a position estimate.

#### 6.1.2.3.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

3) The UE shall:

   1> when a measurement report is triggered:

   2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

      3> if the IE "Vertical Accuracy" is included:

         4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

      3> if the IE "Positioning Methods" is set to "GPS":

         4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

            5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

               6> if the IE "GPS timing of Cell wanted" is set to TRUE:

                  7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

                  7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

                  7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

               6> if the IE "GPS timing of Cell wanted" is set to FALSE:

                  7> include the IE "GPS TOW msec".

            5> if the UE does not support the capability to provide the GPS timing of the cell:

               6> include the IE "GPS TOW msec".

4) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

5) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References:

- Conformance requirements 1, 4 and 5: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 25.331, subclause 8.4.1.3
- Conformance requirement 3: TS 25.331, subclause 8.6.7.19b

#### 6.1.2.3.3 Test Purpose

To verify the UE behaviour in the mobile-originated location request procedure using network-assisted UE-assisted GPS to request a position estimate from the network.

#### 6.1.2.3.4 Method of Test

##### Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment:
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

##### Related PICS/PIXIT Statements

- UE Assisted Network Assisted GPS
- Method of triggering an MO-LR request for a position estimate.

##### Test Procedure

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request through the Facility IE in a REGISTER message. The MO-LR request is of type "locationEstimate".

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE then initiates periodic measurement reporting. After receiving the MEASUREMENT REPORT message, the SS responds with a FACILITY message containing an MO-LR result. When UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request. The IE "MOLR-Type" is set to "locationEstimate". |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | -> | | MEASUREMENT REPORT | UE reports the IE "UE positioning GPS measured results" (Option 1) or requests additional assistance data (Option 2). |
| 8a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 8, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 8b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 8, this message contains the IE "UE positioning GPS measured results". |
| 9 | <- | | FACILITY | LCS MO-LR result message containing location estimate |
| 10 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 11 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type -> locationEstimate<br>Value 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8 (Option 1) or 8b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 8 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 8a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | Set according to 4.2 (unequal to 0) |
| - Vertical accuracy | Set according to 4.2 (unequal to 0) |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

FACILITY (Step 9)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator<br>Transaction identifier<br>Message type<br>Facility | Call Independent SS message (1011)<br><br>FACILITY (0011 1010)<br>Return result = LCS-MOLR<br>LCS-MOLRRes -> locationEstimate<br>locationEstimate ->any values may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values |

RELEASE COMPLETE (Step 10)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator<br>Transaction identifier<br>Message type | Call Independent SS message (1011)<br><br>RELEASE COMPLETE (xx10 1010) |

#### 6.1.2.3.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate".

After step 7, the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

After step 9, the UE shall send a RELEASE COMPLETE message.

### 6.1.2.4 LCS Mobile originated location request/ UE-Based GPS/ Transfer to third party/ Success

#### 6.1.2.4.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities and providing a method to trigger an MO-LR request for transfer to 3rd party.

#### 6.1.2.4.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) If the UE is requesting that its location be sent to an external LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed.

3) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

4) if the IE "Measurement command" has the value "modify":

2> for all IEs present in the MEASUREMENT CONTROL message:

3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

5) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

1> if an update has been provided for this satellite:

2> act as specified in subclause 8.6.7.19.3.4.

If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

6) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

4> if the IE "GPS timing of Cell wanted" is set to FALSE:

5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

7) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

8) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 7 and 8: TS 24.030, subclause 5.1.1
- Conformance requirement 3: TS 25.331, subclause 8.4.1.3
- Conformance requirement 2: TS 23.171, subclause 8.8.1
- Conformance requirement 4: TS 25.331, subclause 8.4.1.3
- Conformance requirement 5: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4
- Conformance requirement 6: TS 25.331, subclause 8.6.7.19.1b
- Reference [12] in these conformance requirements denotes document ICD-GPS-200: "Navstar GPS Space Segment/Navigation User Interface".

#### 6.1.2.4.3 Test Purpose

To verify the UE behaviour in the mobile-originated location request procedure using network-assisted UE-based GPS to request a position estimate from the network for transfer to a third-party LCS client.

#### 6.1.2.4.4 Method of Test

##### Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment:
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- Method of triggering an MO-LR request for transfer to 3rd party

Test Procedure

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes a MO-LR request through the Facility IE in a REGISTER message. The MO-LR request is of type "locationEstimate". The IE "LCSClientExternalID" is set to the ID of a valid external LCS client.

The SS orders an A-GPS positioning measurement using MEASUREMENT CONTROL messages, including assistance data.

The UE sends a MEASUREMENT REPORT message containing a location estimate.

The SS sends a FACILITY message confirming that the transfer to the external client succeeded. When UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request. The IE "MOLR-Type" is set to "locationEstimate". The IE "LCSClientExternalID" is set to a valid ID for an external LCS client. |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | <- | | MEASUREMENT CONTROL | |
| 9 | -> | | MEASUREMENT REPORT | |
| 10 | <- | | FACILITY | LCS MO-LR result message as confirmation that the position estimate was transferred to the requested LCS client. |
| 11 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| | | | | |
| 12 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->locationEstimate<br>lcsClientExternalID -> externalAddress |
| SS version indicator | Value 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 9)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

FACILITY (Step 10)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | FACILITY (0011 1010) |
| Facility | Return result = LCS-MOLR<br>LCS-MOLRRes -> locationEstimate |

RELEASE COMPLETE (Step 11)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |

#### 6.1.2.4.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate" and the IE "LCSClientExternalID" set to the ID of a valid external LCS client.

After step 8, the UE shall respond with a MEASUREMENT REPORT message containing the IE "Position Estimate".

After step 11, the UE shall send a RELEASE COMPLETE message.

### 6.1.2.5 LCS Mobile originated location request/ UE-Assisted GPS/ Transfer to third party/ Success

#### 6.1.2.5.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities and providing a method to trigger an MO-LR request for transfer to 3rd party.

#### 6.1.2.5.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) If the UE is requesting that its location be sent to an external LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed.

3) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

4) The UE shall:

   1> when a measurement report is triggered:

      2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the

variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

3> if the IE "Vertical Accuracy" is included:

4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

3> if the IE "Positioning Methods" is set to "GPS":

4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

6> if the IE "GPS timing of Cell wanted" is set to TRUE:

7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

6> if the IE "GPS timing of Cell wanted" is set to FALSE:

7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

5) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

6) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 5 and 6: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 23.171, subclause 8.8.1
- Conformance requirement 3: TS 25.331, subclause 8.4.1.3
- Conformance requirement 4: TS 25.331, subclauses 8.6.7.19.3.3b

#### 6.1.2.5.3 Test Purpose

To verify the UE behaviour in the mobile-originated location request procedure using network-assisted UE-assisted GPS to request a position estimate from the network for transfer to a third-party LCS client.

#### 6.1.2.5.4 Method of Test

Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2.

- User Equipment:
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI.

### Related PICS/PIXIT Statements

- UE Assisted Network Assisted GPS
- Method of triggering an MO-LR request for transfer to 3rd party

### Test Procedure

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes a MO-LR request through the Facility IE in a REGISTER message. The MO-LR request is of type "locationEstimate". The IE "LCSClientExternalID" is set to the ID of a valid external LCS client.

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message containing IE "UE positioning GPS measured results".

The SS sends a FACILITY message confirming that the transfer to the external client succeeded. When UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request. The IE "MOLR-Type" is set to "locationEstimate". The IE "LCSClientExternalID" is set to a valid ID for an external LCS client. |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | -> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 8a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 8, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 8b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 8, this message contains the IE "UE positioning GPS measured results". |
| 9 | <- | | FACILITY | LCS MO-LR result message as confirmation that the position estimate was transferred to the requested LCS client. |
| 10 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 11 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->locationEstimate<br>lcsClientExternalID -> externalAddress |
| SS version indicator | Value 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Steps 8 (Option 1) or 8b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 8 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 8a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

FACILITY (Step 9)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | FACILITY (0011 1010) |
| Facility | Return result = LCS-MOLR<br>LCS-MOLRRes -> locationEstimate<br>locationEstimate ->any values may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values |

RELEASE COMPLETE (Step 10)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |

#### 6.1.2.5.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate" and the IE "LCSClientExternalID" set to the ID of a valid external LCS client.

After step 7, the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

After step 9, the UE shall send a RELEASE COMPLETE message.

### 6.1.2.6 LCS Mobile originated location request/ UE-Based or UE-Assisted GPS/ Assistance data request/ Failure

#### 6.1.2.6.1 Definition

This test case applies to all UEs supporting UE-based or UE-assisted GPS Location Service capabilities and providing a method to trigger an MO-LR request for assistance data.

#### 6.1.2.6.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) If the network is unable to successfully fulfil the request received from the MS (e.g. to provide a location estimate or location assistance information), it shall clear the transaction by sending a RELEASE COMPLETE message containing a return error component. Error values are specified in 3GPP TS 24.080.

3) PositionMethodFailure: This error is returned by the network when the network is unable to obtain any of the location information requested or none of the information obtained satisfies the requested LCS QoS or if requested LCS assistance data could not be transferred or requested deciphering keys for broadcast assistance data could not be returned.

Reference(s):

- Conformance requirements 1 and 2: TS 24.030, subclause 5.1.1

- Conformance requirement 3: TS 24.080, subclause 4.3.2.29

#### 6.1.2.6.3 Test Purpose

To verify the UE behaviour at a mobile originated location request for GPS assistance data where the network is unable to provide the requested GPS assistance data.

#### 6.1.2.6.4 Method of Test

##### Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:

  The UE shall begin the test with no GPS assistance data stored.
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS, or UE Assisted Network Assisted GPS
- Method of triggering an MO-LR request for assistance data.
- Method of clearing stored GPS assistance data.

##### Test Procedure

The stored GPS assistance data in the UE shall be cleared.

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request of type "assistanceData".

The SS is unable to provide the requested assistance data.

The SS sends a RELEASE COMPLETE message containing a return error component.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | | | Void | |
| 2 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 3 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 4 | <- | | AUTHENTICATION REQUEST | |
| 5 | -> | | AUTHENTICATION RESPONSE | |
| 6 | SS | | | The SS starts ciphering and integrity protection. |
| 7 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "assistanceData". |
| 8 | SS | | | SS is unable to provide the requested assistance data |
| 9 | <- | | RELEASE COMPLETE | SS terminates the dialogue containing a return error component |
| 10 | SS | | | The SS waits for 10 seconds to verify that the UE does not send a RELEASE COMPLETE message. |
| 11 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 7)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->assistanceData<br>locationMethod -> assistedGPS<br>gpsAssistanceData -> OCTET STRING<br>Octets 1 to 38 are coded in the same way as octets 3 to 7+2n of Requested GPS Data IE in 3GPP TS 49.031 (Content is not verified) |
| SS version indicator | Value 1 or above |

RELEASE COMPLETE (Step 9)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |
| Facility | Return error = LCS-MOLR<br>Error -> positionMethodFailure |

### 6.1.2.6.5 Test requirements

After step 6 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "assistanceData".

During step 10 the UE shall not send any RELEASE COMPLETE message.

### 6.1.2.7 LCS Mobile originated location request/ UE-Based GPS/ Position estimate request/ Failure

#### 6.1.2.7.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities and providing a method to trigger an MO-LR request for a position estimate.

#### 6.1.2.7.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

2) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

3) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

   1> if an update has been provided for this satellite:

      2> act as specified in subclause 8.6.7.19.3.4.

   If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

   1> update the variable UE_POSITIONING_GPS_DATA as follows:

      2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

   1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

4) The UE shall when a measurement report is triggered:

   2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

      3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

4> if the IE "GPS timing of Cell wanted" is set to FALSE:

5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

5) The UE shall set the contents of the IE "UE positioning Error" as follows:

…

1> if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS":

2> if there were not enough GPS satellites to be received:

3> set IE "Error reason" to "Not Enough GPS Satellites".

2> if some GPS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE ""Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE:

4> include the IE "GPS Additional Assistance Data Request".

6) If the network is unable to successfully fulfil the request received from the MS (e.g. to provide a location estimate or location assistance information), it shall clear the transaction by sending a RELEASE COMPLETE message containing a return error component. Error values are specified in 3GPP TS 24.080.

7) PositionMethodFailure: This error is returned by the network when the network is unable to obtain any of the location information requested or none of the information obtained satisfies the requested LCS QoS or if requested LCS assistance data could not be transferred or requested deciphering keys for broadcast assistance data could not be returned.

Reference(s):

- Conformance requirements 1 and 6: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 25.331, subclause 8.4.1.3.

- Conformance requirement 3: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 4: TS 25.331, subclause 8.6.7.19.1b
- Conformance requirement 5: TS 25.331, subclause 8.6.7.19.5
- Conformance requirement 7: TS 24.080, subclause 4.3.2.29
- Reference [12] in these conformance requirements denotes document ICD-GPS-200: "Navstar GPS Space Segment/Navigation User Interface".

#### 6.1.2.7.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted UE-based GPS when the MO-LR procedure fails due to failure of positioning method.

#### 6.1.2.7.4 Method of Test

##### Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellite Simulator is switched off
- User Equipment:
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI
  - The UE shall begin the test with no GPS assistance data stored.

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- Method of triggering an MO-LR request for a position estimate.
- Method of clearing stored GPS assistance data

##### Test Procedure

The stored GPS assistance data in the UE shall be cleared.

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

Then the UE invokes an MO-LR request of type "locationEstimate". The SS orders an A-GPS positioning measurement using two MEASUREMENT CONTROL messages, including assistance data.

The UE sends a MEASUREMENT REPORT message reporting a positioning error for not enough satellite signals received.

The SS sends a RELEASE COMPLETE message containing a return error component.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with a LCS MO-LR request of type "locationEstimate". |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | <- | | MEASUREMENT CONTROL | |
| 9 | -> | | MEASUREMENT REPORT | Positioning error report "not enough GPS satellites" |
| 10 | SS | | | SS is unable to fulfil the MO-LR request |
| 11 | <- | | RELEASE COMPLETE | SS terminates the dialogue containing a return error component |
| 12 | SS | | | The SS releases the RRC connection and the test case ends. |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->locationEstimate |
| SS version indicator | Value 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Not Enough GPS Satellites |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

RELEASE COMPLETE (Step 11)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |
| Facility | Return error = LCS-MOLR<br>Error -> positionMethodFailure |

#### 6.1.2.7.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with a LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate".

After step 8, the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning error", with "Error reason" set to "Not Enough GPS Satellites".

## 6.1.3 Assisted GPS Mobile Terminated Tests

### 6.1.3.1 LCS Mobile terminated location request/ UE-Based GPS

#### 6.1.3.1.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.3.1.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

   In the case of location notification no response is required from the UE, the UE shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

2) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

3) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

   1> if an update has been provided for this satellite:

2> act as specified in subclause 8.6.7.19.3.4 of TS 25.331.

4) If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in ICD-GPS-200.

5) If the IE "UE positioning GPS reference time" is included, the UE shall:

1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

6) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

1> use it as a priori knowledge of the approximate location of the UE.

7) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

4> if the IE "GPS timing of Cell wanted" is set to FALSE:

5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

References

- Conformance requirement 1: TS 24.030, clause 4.1.1.
- Conformance requirement 2: TS 25.331, clause 8.4.1.3.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.3.3a.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.3.4.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.3.7.
- Conformance requirement 6: TS 25.331, clause 8.6.7.19.3.8.
- Conformance requirement 7: TS 25.331, clause 8.6.7.19.1b.

#### 6.1.3.1.3 Test Purpose

To verify that when the UE receives a REGISTER message during an established CS call, containing a LCS Location Notification Invoke component set to NotifyLocationAllowed, the UE displays information about the LCS client correctly and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

To verify that the UE responds with a Measurement Report message containing UE location when the assistance data is divided between several Measurement Control messages using Measurement Command "Modify".

#### 6.1.3.1.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE supporting CS domain services
- UE Based Network Assisted GPS
- UE supporting Mobile Terminated Location Request

Test Procedure

The SS initiates authentication and ciphering and sends an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The UE then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

The SS orders an A-GPS positioning measurement using two MEASUREMENT CONTROL messages. The last MEASUREMENT CONTROL message orders periodical reporting.

The UE then initiates periodic measurement reporting and sends a MEASUREMENT REPORT message including a location estimate.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <- | | AUTHENTICATION REQUEST | |
| 2 | -> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE displays information about LCS client |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | <- | | MEASUREMENT CONTROL | Periodical reporting is configured. |
| 9 | -> | | MEASUREMENT REPORT | |
| 10 | SS | | | SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = lcs-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed,<br>locationType -> current Location ,<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = lcs-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 9)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

6.1.3.1.5 Test requirements

After step 5 the UE shall send a RELEASE COMPLETE message.

After step 8 the UE shall respond with a MEASUREMENT REPORT message.

### 6.1.3.2 LCS Mobile-terminated location request/UE-Based GPS/ Request for additional assistance data/ Success

#### 6.1.3.2.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.3.2.2 Conformance requirements

1) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      - if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

        - if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

          5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

          5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

2) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

   1> if an update has been provided for this satellite:

      2> act as specified in subclause 8.6.7.19.3.4.

3) If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

   1> update the variable UE_POSITIONING_GPS_DATA as follows:

      2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

   1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

4) If the IE "UE positioning GPS reference time" is included, the UE shall:

   1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

   - store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

   NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

   - if the IE "SFN" and IE "UTRAN GPS timing of cell frames" are included:

     - if the UE is able to utilise the IEs:

- store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;
- if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:
  - if the UE is not in CELL_DCH state:
    - use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell.
  - if the UE is in CELL_DCH state:
    - ignore IEs "SFN" and "UTRAN GPS timing of cell frames".
- if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:
  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;
  - use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

- if the IE "SFN-TOW Uncertainty" is included:
  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 10ms.
- if the IE "$T_{UTRAN-GPS}$ drift rate" is included:
  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA; and
  - may use it as an estimate of the drift rate of the NODE B clock relative to GPS time.
- if the IE "GPS TOW Assist" is included:
  - for each satellite:

    3> delete all information currently stored in the IE "GPS TOW Assist" in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA;

    3> store the received GPS TOW Assist information in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA.

5) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

   1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

   1> use it as a priori knowledge of the approximate location of the UE.

6) If IE "UE positioning GPS ionospheric model" is included, the UE shall:

   1> store this IE in the IE "UE positioning GPS ionospheric model" in variable UE_POSITIONING_GPS_DATA;

   1> act on these GPS ionospheric model parameters in a manner similar to that specified in [12].

7) The UE shall when a measurement report is triggered:

   2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

- include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:
  - if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or
  - if the IE "GPS timing of Cell wanted" is set to FALSE:
    - include the IE "GPS TOW msec".
  - if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":
    - if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":
      - if the UE has been able to calculate a 3-dimensional position:
        - include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.
      - if the UE has not been able to calculate a 3-dimensional position:
        - act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".
  - if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":
  - if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

8) The UE shall set the contents of the IE "UE positioning Error" as follows:

…

1> if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS":

2> if there were not enough GPS satellites to be received:

3> set IE "Error reason" to "Not Enough GPS Satellites".

2> if some GPS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE ""Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE:

4> include the IE "GPS Additional Assistance Data Request".

Reference(s):

- Conformance requirement 1: TS 25.331, subclause 8.4.1.3.
- Conformance requirement 2: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.1b.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.3.7.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.3.8.
- Conformance requirement 6: TS 25.331, clause 8.6.7.19.3.5.
- Conformance requirement 7: TS 25.331, clause 8.6.7.19.1b.
- Conformance requirement 8: TS 25.331, clause 8.6.7.19.5.

- Reference [12] in these conformance requirements denotes document ICD-GPS-200: "Navstar GPS Space Segment/Navigation User Interface".

#### 6.1.3.2.3 Test Purpose

To verify the UE's behaviour in a mobile-terminated location request procedure using UE-based A-GPS with assistance data from the network.

To verify that the UE in CELL_DCH state accepts assistance data received in multiple MEASUREMENT CONTROL messages.

To verify that the UE includes the IE "GPS Additional Assistance Data Request" to request assistance data when it does not have enough assistance data to compute a position.

#### 6.1.3.2.4 Method of Test

##### Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment:
  - The UE shall begin the test with no GPS assistance data stored.
  - State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- Method of clearing stored GPS assistance data
- UE supporting Mobile Terminated Location Request

##### Test Procedure

The stored GPS assistance data in the UE shall be cleared.

The SS initiates authentication and ciphering and sends an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The UE then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

The SS orders an A-GPS positioning measurement using MEASUREMENT CONTROL including no assistance data.

The UE sends a MEASUREMENT REPORT message to report a positioning error, requesting further assistance data. The SS response with one or more MEASUREMENT CONTROL messages that include the requested assistance data and instructs the UE not to repeat the request for assistance data. The final MEASUREMENT CONTROL message orders periodic reporting.

The UE performs positioning measurements and responds with a MEASUREMENT REPORT message containing a valid position estimate in the IE "UE Positioning Position Estimate Info".

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <- | | AUTHENTICATION REQUEST | |
| 2 | -> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE displays information about LCS client |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | <-- | | MEASUREMENT CONTROL | No assistance data, and "Additional Assistance Data Request" IE set to TRUE. |
| 8 | --> | | MEASUREMENT REPORT | Positioning error report with request for further assistance data. |
| 9 | <-- | | MEASUREMENT CONTROL | The SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5.<br>The final MEASUREMENT CONTROL message contains:<br>Reporting mode: Periodical reporting<br>Amount of reporting: 1<br>Reporting interval: 64000 |
| 10 | --> | | MEASUREMENT REPORT | Measurement report message containing UE position estimate. |
| 11 | SS | | | SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = lcs-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed,<br>locationType -> current Location ,<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = lcs-LocationNotification<br><br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Measurement Reporting Mode | Not present |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Inadequate assistance data for UE-based A-GPS" in 4.3.2 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Set as required according to position in sequence of messages |
| - Amount of reporting | Set as required according to position in sequence of messages |
| - Reporting interval | Set as required according to position in sequence of messages |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 10):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

#### 6.1.3.2.5 Test Requirements

At step 7 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning error", with "Error reason" set to "Assistance Data Missing".

At step 9 the UE shall send a MEASUREMENT REPORT message containing a valid UE position estimate.

### 6.1.3.3 LCS Mobile-terminated location request/UE-Based GPS/ Failure – Not Enough Satellites

#### 6.1.3.3.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.3.3.2 Conformance requirements

7) if the IE "Measurement command" has the value "modify":

2> for all IEs present in the MEASUREMENT CONTROL message:

- if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

- if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

8) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

1> if an update has been provided for this satellite:

2> act as specified in subclause 8.6.7.19.3.4.

9) If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

10) If the IE "UE positioning GPS reference time" is included, the UE shall:

1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

- store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

- if the IE "SFN" and IE "UTRAN GPS timing of cell frames" are included:

- if the UE is able to utilise the IEs:

- store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;
- if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:
  - if the UE is not in CELL_DCH state:
    - use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell.
  - if the UE is in CELL_DCH state:
    - ignore IEs "SFN" and "UTRAN GPS timing of cell frames".
- if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:
  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;
  - use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

- if the IE "SFN-TOW Uncertainty" is included:
  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 10ms.
- if the IE "$T_{UTRAN-GPS}$ drift rate" is included:
  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA; and
  - may use it as an estimate of the drift rate of the NODE B clock relative to GPS time.
- if the IE "GPS TOW Assist" is included:
  - for each satellite:

    3> delete all information currently stored in the IE "GPS TOW Assist" in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA;

    3> store the received GPS TOW Assist information in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA.

11) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

1> use it as a priori knowledge of the approximate location of the UE.

12) If IE "UE positioning GPS ionospheric model" is included, the UE shall:

1> store this IE in the IE "UE positioning GPS ionospheric model" in variable UE_POSITIONING_GPS_DATA;

1> act on these GPS ionospheric model parameters in a manner similar to that specified in [12].

7) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

- include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:
  - if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or
  - if the IE "GPS timing of Cell wanted" is set to FALSE:
    - include the IE "GPS TOW msec".
  - if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":
    - if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":
      - if the UE has been able to calculate a 3-dimensional position:
        - include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.
      - if the UE has not been able to calculate a 3-dimensional position:
        - act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".
  - if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":
  - if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

7> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

8) The UE shall set the contents of the IE "UE positioning Error" as follows:

…

1> if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS":

2> if there were not enough GPS satellites to be received:

3> set IE "Error reason" to "Not Enough GPS Satellites".

2> if some GPS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE ""Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE:

4> include the IE "GPS Additional Assistance Data Request".

Reference(s):

- Conformance requirement 1: TS 25.331, subclause 8.4.1.3.
- Conformance requirement 2: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.1b.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.3.7.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.3.8.
- Conformance requirement 6: TS 25.331, clause 8.6.7.19.3.5.
- Conformance requirement 7: TS 25.331, clause 8.6.7.19.1b.
- Conformance requirement 8: TS 25.331, clause 8.6.7.19.5.

- Reference [12] in these conformance requirements denotes document ICD-GPS-200: "Navstar GPS Space Segment/Navigation User Interface".

#### 6.1.3.3.3 Test Purpose

To verify the UE's behaviour in a mobile-terminated location request procedure using UE-based A-GPS with assistance data from the network.

To verify that the UE in CELL_DCH state accepts assistance data received in multiple MEASUREMENT CONTROL messages.

To verify that the UE sets the IE Error Reason in 'UE Positioning Error' to 'Not Enough GPS Satellites' when it does not receive enough satellite signals to compute a position.

#### 6.1.3.3.4 Method of Test

##### Initial Conditions

- System Simulator:
  - 1 cell, default parameters.
  - Satellite Simulator is switched off.
- User Equipment:
  - State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.
  - The UE shall begin the test with no GPS assistance data stored.

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- Method of clearing stored GPS assistance data
- UE supporting Mobile Terminated Location Request

##### Test Procedure

The stored GPS assistance data in the UE shall be cleared.

The SS initiates authentication and ciphering and sends an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The UE then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

The SS orders an A-GPS positioning measurement using two MEASUREMENT CONTROL messages. The last MEASUREMENT CONTROL message orders periodical reporting.

The UE sends a MEASUREMENT REPORT message reporting a positioning error for not enough satellite signal.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE displays information about LCS client |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | <-- | | MEASUREMENT CONTROL | |
| 8 | <-- | | MEASUREMENT CONTROL | Periodical reporting is configured |
| 9 | --> | | MEASUREMENT REPORT | Positioning error report 'not enough GPS satellites' |
| 10 | SS | | | SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = lcs-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed,<br>locationType -> current Location ,<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = lcs-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Not Enough GPS Satellites |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

#### 6.1.3.3.5 Test Requirements

At step 8 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning error", with "Error reason" set to "Not Enough GPS Satellites".

### 6.1.3.4 LCS Mobile terminated location request/ UE-Assisted GPS/ Success

#### 6.1.3.4.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities.

#### 6.1.3.4.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

   In the case of location notification no response is required from the UE, the UE shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

2) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

3) The UE shall:

   1> when a measurement report is triggered:

   2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

      3> if the IE "Vertical Accuracy" is included:

         4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

      3> if the IE "Positioning Methods" is set to "GPS":

         4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

            5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

               6> if the IE "GPS timing of Cell wanted" is set to TRUE:

                  7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

                  7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

                  7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

               6> if the IE "GPS timing of Cell wanted" is set to FALSE:

                  7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

References

- Conformance requirement 1: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 25.331, clause 8.4.1.3.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.1a.

#### 6.1.3.4.3 Test Purpose

To verify the UE behaviour in the mobile-terminated location request procedure using network-assisted UE-assisted GPS to deliver UE positioning measurements to the network.

#### 6.1.3.4.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE supporting CS domain services
- UE Assisted Network Assisted GPS
- UE supporting Mobile Terminated Location Request

Test Procedure

The SS initiates authentication and ciphering and sends an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The UE then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message. The assistance data is as described in subclause 4.3.3 (Adequate assistance data for UE-assisted A-GPS). The MEASUREMENT CONTROL message orders periodical reporting.

The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE then initiates periodic measurement reporting and sends a MEASUREMENT REPORT message including the IE "UE positioning GPS measured results".

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE displays information about LCS client |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | <- | | MEASUREMENT CONTROL | Periodical reporting is configured. |
| 8 | -> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 8a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 8, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 8b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 8, this message contains the IE "UE positioning GPS measured results". |
| 9 | SS | | | SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = lcs-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed,<br>locationType -> current Location ,<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = lcs-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8 (Option 1) or 8b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 8 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 8a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | Set according to 4.2 (unequal to 0) |
| - Vertical accuracy | Set according to 4.2 (unequal to 0) |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

#### 6.1.3.4.5 Test requirements

After step 5 the UE shall send a RELEASE COMPLETE message.

After step 7 the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

### 6.1.3.5 LCS Mobile terminated location request/ UE-Assisted GPS/ Request for additional assistance data/ Success

#### 6.1.3.5.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities.

#### 6.1.3.5.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

   In the case of location notification no response is required from the UE, the UE shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

2) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

3) The UE shall:

   1> when a measurement report is triggered:

   2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

      3> if the IE "Vertical Accuracy" is included:

         4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

      3> if the IE "Positioning Methods" is set to "GPS":

         4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

            5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

               6> if the IE "GPS timing of Cell wanted" is set to TRUE:

7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

6> if the IE "GPS timing of Cell wanted" is set to FALSE:

7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

4) 1> if the UE is not able to report the requested measurement results:

2> include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as specified in subclause 8.6.7.19.5.

5) if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS":

2> if there were not enough GPS satellites to be received:

3> set IE "Error reason" to "Not Enough GPS Satellites".

2> if some GPS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to FALSE:

4> not include the IE "GPS Additional Assistance Data Request", and use the assistance data available for doing a positioning estimate.

References

- Conformance requirement 1: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 25.331, clause 8.4.1.3.
- Conformance requirements 3 and 4: TS 25.331, clause 8.6.7.19.1a.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.5.

#### 6.1.3.5.3 Test Purpose

To verify the UE behaviour in the mobile-terminated location request procedure using network-assisted UE-assisted GPS to deliver UE positioning measurements to the network.

To verify that the UE includes the IE "GPS Additional Assistance Data Request" to request additional assistance data when it does not have enough assistance data to perform the requested measurements.

#### 6.1.3.5.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- The UE shall begin the test with no GPS assistance data stored.
- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

### Related PICS/PIXIT Statements

- UE supporting CS domain services
- UE Assisted Network Assisted GPS
- Method of clearing stored GPS assistance data
- UE supporting Mobile Terminated Location Request

### Test Procedure

The stored GPS assistance data in the UE shall be cleared.

The SS initiates authentication and ciphering and sends an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The UE then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message. The assistance data is as described in subclause 4.3.2 (Inadequate assistance data for UE-assisted A-GPS). The MEASUREMENT CONTROL message orders periodical reporting.

The UE then initiates periodic measurement reporting and sends a MEASUREMENT REPORT message including a request for additional assistance data. The SS responds with one or more MEASUREMENT CONTROL messages containing assistance data as specified in subclause 4.3.5 (Response to additional assistance data requests from UE). The UE sends a MEASUREMENT REPORT message including the IE "UE positioning GPS measured results".

### Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE displays information about LCS client |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | <- | | MEASUREMENT CONTROL | Periodical reporting is configured. Assistance data set as specified in subclause 4.3.2 (Inadequate assistance data for UE-assisted A-GPS). |
| 8 | -> | | MEASUREMENT REPORT | UE requests additional assistance data. |
| 9 | <- | | MEASUREMENT CONTROL | The SS provides the requested data in one or more MEASUREMENT CONTROL messages as defined in subclause 4.3.5 |
| 10 | -> | | MEASUREMENT REPORT | UE sends the IE "UE positioning GPS measured results". |
| 11 | SS | | | SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = lcs-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed,<br>locationType -> current Location ,<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = lcs-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Inadequate assistance data for UE-assisted A-GPS" in 4.3.2 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Present, if requested by UE |
| - UTC model | Present, if requested by UE |
| - Ionospheric model | Present, if requested by UE |
| - Navigation model | Present, if requested by UE |
| - DGPS corrections | Present, if requested by UE |
| - Reference location | Present, if requested by UE |
| - Reference time | Present, if requested by UE |
| - Acquisition assistance | Present, if requested by UE |
| - Real-time integrity | Present, if requested by UE |
| - Navigation model additional data | Present, if requested by UE |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 10)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

#### 6.1.3.5.5 Test requirements

After step 5 the UE shall send a RELEASE COMPLETE message.

After step 7 the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning error", with "Error reason" set to "Assistance data missing".

After step 9 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

### 6.1.3.6 LCS Mobile terminated location request/ UE-Based GPS/ Privacy Verification/ Location Allowed if No Response

#### 6.1.3.6.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.3.6.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In case of privacy verification the MS shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

3) If the timer expires in the network before any response from the MS (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in GSM 03.71 for GSM and TS 23.171 for UMTS (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

4) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

5) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

6) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

   1> if an update has been provided for this satellite:

      2> act as specified in subclause 8.6.7.19.3.4 of TS 25.331.

7) If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

   1> update the variable UE_POSITIONING_GPS_DATA as follows:

      2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

   1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in ICD-GPS-200.

8) If the IE "UE positioning GPS reference time" is included, the UE shall:

   1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

   1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

   NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

9) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

   1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

   1> use it as a priori knowledge of the approximate location of the UE.

10) The UE shall when a measurement report is triggered:

   2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

4> if the IE "GPS timing of Cell wanted" is set to FALSE:

5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

References

- Conformance requirement 1, 2 and 3: TS 24.030, clause 4.1.1.

-- Conformance requirements 4 and 5: TS 25.331, subclause 8.4.1.3

- Conformance requirement 6: TS 25.331, clause 8.6.7.19.3.3a.

- Conformance requirement 7: TS 25.331, clause 8.6.7.19.3.4.

- Conformance requirement 8: TS 25.331, clause 8.6.7.19.3.7.

- Conformance requirement 9: TS 25.331, clause 8.6.7.19.3.8.

- Conformance requirement 10: TS 25.331, clause 8.6.7.19.1b.

#### 6.1.3.6.3 Test Purpose

To verify that when the UE receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the UE notifies the user of the request and indicates that the default response is location allowed if no response and providing the opportunity to accept or deny the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied or permissionGranted as appropriate.

#### 6.1.3.6.4 Method of Test

##### Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- px_UeLcsNotification: value for UE LCS Notification timeout timer
- UE supporting Mobile Terminated Location Request

##### Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The LCS Client Name contained in the USSD text string of the lcs-LocationNotification should be displayed with the option to accept or deny the request and an indication that location will be allowed if no user response is received.

The user accepts the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

The SS orders an A-GPS positioning measurement using MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message including a location estimate.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The user denies the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The user ignores the location request by taking no action.

The SS orders an A-GPS positioning measurement using MEASUREMENT CONTROL messages.

The UE then sends a MEASUREMENT REPORT message including a location estimate.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 5 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 6 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 7 | UE | | | The user accepts the location request before timer T(LCSN) expires |
| 8 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionGranted |
| 9 | <- | | MEASUREMENT CONTROL | |
| 10 | <- | | MEASUREMENT CONTROL | |
| 11 | -> | | MEASUREMENT REPORT | |
| 12 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 13 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 14 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 15 | UE | | | The user denies the location request before timer T(LCSN) expires |
| 16 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionDenied |
| 17 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 18 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 19 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 20 | UE | | | The user does not reply |
| 21 | SS | | | SS waits until T(LCSN) expires to ensure that the UE does not send a RELEASE COMPLETE message. |
| 22 | <- | | RELEASE COMPLETE | SS terminates the dialogue |
| 23 | <- | | MEASUREMENT CONTROL | |
| 24 | <- | | MEASUREMENT CONTROL | |
| 25 | -> | | MEASUREMENT REPORT | |
| 26 | SS | | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 10):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 11)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

REGISTER (Step 12)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 16)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionDenied |

REGISTER (Step 17)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 22)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |

MEASUREMENT CONTROL (Step 23):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 24):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | Not present |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | Set according to 4.2 (unequal to 0) |
| - Vertical accuracy | Set according to 4.2 (unequal to 0) |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 25)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

6.1.3.6.5 Test requirements

After step 7 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionGranted.

After step 10 the UE shall respond with a MEASUREMENT REPORT message containing a UE position estimate.

After step 15 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionDenied.

After step 24 the UE shall respond with a MEASUREMENT REPORT message containing a UE position estimate.

### 6.1.3.7 LCS Mobile terminated location request/ UE-Based GPS/ Privacy Verification/ Location Not Allowed if No Response

#### 6.1.3.7.1 Definition

This test case applies to all UEs supporting UE-Based GPS Location Service capabilities.

#### 6.1.3.7.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In case of privacy verification the MS shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

3) If the timer expires in the network before any response from the MS (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in GSM 03.71 for GSM and TS 23.171 for UMTS (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

4) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

5) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

6) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

   1> if an update has been provided for this satellite:

      2> act as specified in subclause 8.6.7.19.3.4 of TS 25.331.

7) If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in ICD-GPS-200.

8) If the IE "UE positioning GPS reference time" is included, the UE shall:

1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the GPS Time-of-Week at the time of reception of the complete message containing the IE "GPS TOW msec";

NOTE: The UE does not need to apply any compensation on the GPS Time-of-Week.

9) If the IE "UE positioning GPS reference UE position" is included, the UE shall:

1> store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA; and

1> use it as a priori knowledge of the approximate location of the UE.

10) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or on the list of satellites included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE does not support the capability to perform the UE GPS timing of cell frames measurement; or

4> if the IE "GPS timing of Cell wanted" is set to FALSE:

5> include the IE "GPS TOW msec".

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

References

- Conformance requirement 1, 2 and 3: TS 24.030, clause 4.1.1.
- Conformance requirements 4 and 5: TS 25.331, clause 8.4.1.3.
- Conformance requirement 6: TS 25.331, clause 8.6.7.19.3.3a.
- Conformance requirement 7: TS 25.331, clause 8.6.7.19.3.4.
- Conformance requirement 8: TS 25.331, clause 8.6.7.19.3.7.
- Conformance requirement 9: TS 25.331, clause 8.6.7.19.3.8.
- Conformance requirement 10: TS 25.331, clause 8.6.7.19.1b.

### 6.1.3.7.3 Test Purpose

To verify that when the UE receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, the UE notifies the user of the request and indicates that the default response is location not allowed if no response and providing the opportunity to accept or deny the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied or permissionGranted as appropriate.

### 6.1.3.7.4 Method of Test

#### Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

#### Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- px_UeLcsNotification: value for UE LCS Notification timeout timer
- UE supporting Mobile Terminated Location Request

#### Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The LCS Client Name contained in the USSD text string of the lcs-LocationNotification should be displayed with the option to accept or deny the request and an indication that location will be not allowed if no user response is received.

The user accepts the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

The SS orders an A-GPS positioning measurement using MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message including a location estimate.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The user denies the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The user ignores the location request by taking no action. If the timer expires in the SS before any response from the UE is received, the SS interprets this by applying the default treatment LocationNotAllowed.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 5 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 6 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 7 | UE | | | The user accepts the location request before timer T(LCSN) expires |
| 8 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionGranted |
| 9 | <- | | MEASUREMENT CONTROL | |
| 10 | <- | | MEASUREMENT CONTROL | |
| 11 | -> | | MEASUREMENT REPORT | |
| 12 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 13 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 14 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 15 | UE | | | The user denies the location request before timer T(LCSN) expires |
| 16 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionDenied |
| 17 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 18 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 19 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 20 | UE | | | The user does not reply |
| 21 | SS | | | SS waits until T(LCSN) expires to verify that the UE does not send a RELEASE COMPLETE message. |
| 22 | <- | | RELEASE COMPLETE | SS terminates the dialogue |
| 23 | SS | | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 10):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | Not present |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GPS" in 4.3.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 11)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | |
| - GPS reference time only | |
| - GPS TOW msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

REGISTER (Step 12)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 16)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionDenied |

REGISTER (Step 17)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 22)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |

#### 6.1.3.7.5 Test requirements

After step 7 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionGranted.

After step 10 the UE shall respond with a MEASUREMENT REPORT message containing a UE position estimate.

After step 15 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionDenied.

During step 21 the UE shall not send any RELEASE COMPLETE message.

## 6.1.3.8 LCS Mobile terminated location request/ UE-Assisted GPS/ Privacy Verification/ Location Allowed if No Response

### 6.1.3.8.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities.

### 6.1.3.8.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In case of privacy verification the MS shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

3) If the timer expires in the network before any response from the MS (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in GSM 03.71 for GSM and TS 23.171 for UMTS (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

4) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

5) The UE shall:

   1> when a measurement report is triggered:

      2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

         3> if the IE "Vertical Accuracy" is included:

            4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

         3> if the IE "Positioning Methods" is set to "GPS":

            4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

               5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

                  6> if the IE "GPS timing of Cell wanted" is set to TRUE:

                     7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

                     7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

                     7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

                  6> if the IE "GPS timing of Cell wanted" is set to FALSE:

                     7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

References

- Conformance requirement 1, 2 and 3: TS 24.030, clause 4.1.1.
- Conformance requirement 4: TS 25.331, clause 8.4.1.3.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.3.3b.

#### 6.1.3.8.3 Test Purpose

To verify that when the UE receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the UE notifies the user of the request and indicates that the default response is location allowed if no response and providing the opportunity to accept or deny the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied or permissionGranted as appropriate.

#### 6.1.3.8.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Assisted Network Assisted GPS
- px_UeLcsNotification: value for UE LCS Notification timeout timer
- UE supporting Mobile Terminated Location Request

Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The LCS Client Name contained in the USSD text string of the lcs-LocationNotification should be displayed with the option to accept or deny the request and an indication that location will be allowed if no user response is received.

The user accepts the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message including IE "UE positioning GPS measured results".

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The user denies the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The user ignores the location request by taking no action. If the timer expires in the SS before any response from the UE is received, the SS interprets this by applying the default treatment LocationAllowed.

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE then sends a MEASUREMENT REPORT message including IE "UE positioning GPS measured results".

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 5 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 6 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 7 | UE | | | The user accepts the location request before timer T(LCSN) expires |
| 8 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionGranted |
| 9 | <- | | MEASUREMENT CONTROL | Assistance data set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| 10 | -> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 10a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 10, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 10b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 10, this message contains the IE "UE positioning GPS measured results". |
| 11 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 12 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 13 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 14 | UE | | | The user denies the location request before timer T(LCSN) expires |
| 15 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionDenied |
| 16 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 17 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 18 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 19 | UE | | | The user does not reply |
| 20 | SS | | | SS waits until T(LCSN) expires to verify that the UE does not send a RELEASE COMPLETE message. |
| 21 | <- | | RELEASE COMPLETE | SS terminates the dialogue |
| 22 | <- | | MEASUREMENT CONTROL | Assistance data set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.5 |
| 23 | -> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 23a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 23, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |

| | | | |
|---|---|---|---|
| 23b | -> | MEASUREMENT REPORT | If UE requested additional assistance data in step 23, this message contains the IE "UE positioning GPS measured results". |
| 24 | SS | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Steps 10 (Option 1) or 10b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 10 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 10a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

REGISTER (Step 11)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 15)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionDenied |

REGISTER (Step 16)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 21)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |

MEASUREMENT CONTROL (Step 22):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Steps 23 (Option 1) or 23b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 23 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 23a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

#### 6.1.3.8.5 Test requirements

After step 7 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionGranted.

After step 9 the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

After step 14 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionDenied.

After step 22 the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

### 6.1.3.9 LCS Mobile terminated location request/ UE-Assisted GPS/ Privacy Verification/ Location Not Allowed if No Response

#### 6.1.3.9.1 Definition

This test case applies to all UEs supporting UE-Assisted GPS Location Service capabilities.

#### 6.1.3.9.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In case of privacy verification the MS shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

3) If the timer expires in the network before any response from the MS (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in GSM 03.71 for GSM and TS 23.171 for UMTS (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

4) if the IE "Measurement command" has the value "setup":

   2> store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

   …

   2> for any other measurement type:

      3> if the measurement is valid in the current RRC state of the UE:

         4> begin measurements according to the stored control information for this measurement identity.

5) The UE shall:

   1> when a measurement report is triggered:

      2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

         3> if the IE "Vertical Accuracy" is included:

            4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

         3> if the IE "Positioning Methods" is set to "GPS":

            4> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

               5> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

                  6> if the IE "GPS timing of Cell wanted" is set to TRUE:

7> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

7> include the IE "Reference SFN" and the IE "UE GPS timing of cell frames".

6> if the IE "GPS timing of Cell wanted" is set to FALSE:

7> include the IE "GPS TOW msec".

5> if the UE does not support the capability to provide the GPS timing of the cell:

6> include the IE "GPS TOW msec".

References

- Conformance requirement 1, 2 and 3: TS 24.030, clause 4.1.1.
- Conformance requirement 4: TS 25.331, clause 8.4.1.3.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.3.3b.

### 6.1.3.9.3 Test Purpose

To verify that when the UE receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, the UE notifies the user of the request and indicates that the default response is location not allowed if no response and providing the opportunity to accept or deny the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied or permissionGranted as appropriate.

### 6.1.3.9.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters
- Satellites: As specified in 4.2

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Assisted Network Assisted GPS
- px_UeLcsNotification: value for UE LCS Notification timeout timer
- UE supporting Mobile Terminated Location Request

Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The LCS Client Name contained in the USSD text string of the lcs-LocationNotification should be displayed with the option to accept or deny the request and an indication that location will be allowed if no user response is received.

The user accepts the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

The SS orders an A-GPS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.3.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message including IE "UE positioning GPS measured results".

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The user denies the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The user ignores the location request by taking no action. If the timer expires in the SS before any response from the UE is received, the SS interprets this by applying the default treatment LocationNotAllowed.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 5 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 6 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 7 | UE | | | The user accepts the location request before timer T(LCSN) expires |
| 8 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionGranted |
| 9 | <- | | MEASUREMENT CONTROL | |
| 10 | -> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 10a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 10, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.3.5. |
| 10b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 10, this message contains the IE "UE positioning GPS measured results". |
| 11 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 12 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 13 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 14 | UE | | | The user denies the location request before timer T(LCSN) expires |
| 15 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionDenied |
| 16 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 17 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 18 | UE | | | The UE notifies the user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 19 | UE | | | The user does not reply |
| 20 | SS | | | SS waits until T(LCSN) expires to verify that the UE does not send a RELEASE COMPLETE message. |
| 21 | <- | | RELEASE COMPLETE | SS terminates the dialogue |
| 22 | SS | | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 9):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GPS" in 4.3.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Steps 10 (Option 1) or 10b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present |
| - UE positioning error | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT REPORT (Step 10 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS additional assistance data request | |
| - Almanac | Not checked |
| - UTC model | Not checked |
| - Ionospheric model | Not checked |
| - Navigation model | Not checked |
| - DGPS corrections | Not checked |
| - Reference location | Not checked |
| - Reference time | Not checked |
| - Acquisition assistance | Not checked |
| - Real-time integrity | Not checked |
| - Navigation model additional data | Not checked |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Event Results | Not present |

MEASUREMENT CONTROL (Step 10a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.3.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

REGISTER (Step 11)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-<br>LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 15)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionDenied |

REGISTER (Step 16)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 21)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0x10 1010) |

#### 6.1.3.9.5 Test requirements

After step 7 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionGranted.

After step 9 the UE shall respond with a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results".

After step 14 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionDenied.

During step 20 the UE shall not send any RELEASE COMPLETE message.

### 6.1.3.10 LCS Mobile terminated location request/ UE-Based or UE-Assisted GPS/ Configuration Incomplete

#### 6.1.3.10.1 Definition

This test case applies to all UEs supporting UE-based or UE-assisted network assisted GPS, but not UE-based OTDOA.

#### 6.1.3.10.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In the case of location notification no response is required from the MS, the MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

3) The UE shall perform the following consistency check:

   1> if UE, according to its capabilities, does not support UE-based OTDOA and if IE "Positioning Methods" is set to "OTDOA" and if IE "Method Type" is set to "UE-based":

      2> set the variable CONFIGURATION_INCOMPLETE to TRUE.

   1> if UE, according to its capabilities, does not support UE-based GPS and if IE "Positioning Methods" is set to "GPS" and if IE "Method Type" is set to "UE-based":

      2> set the variable CONFIGURATION_INCOMPLETE to TRUE.

1> if UE, according to its capabilities, does not support UE-assisted GPS and if IE "Positioning Methods" is set to "GPS" and if IE "Method Type" is set to "UE-assisted":

2> set the variable CONFIGURATION_INCOMPLETE to TRUE.

1> if UE, according to its capabilities, does not support UE-based positioning and if IE "Positioning Methods" is set to "OTDOAorGPS" and if IE "Method Type" is set to "UE-based":

2> set the variable CONFIGURATION_INCOMPLETE to TRUE.

1> if UE, according to its capabilities, does not support Rx-Tx time difference type 2 measurement and if IE "Positioning Methods" is set to "Cell ID":

2> set the variable CONFIGURATION_INCOMPLETE to TRUE.

1> if UE, according to its capabilities, does not support UE GPS timing of cell frames measurement and if IE "GPS timing of Cell wanted" is set to TRUE:

2> set the variable CONFIGURATION_INCOMPLETE to TRUE.

4) If the variable CONFIGURATION_INCOMPLETE is set to TRUE, the UE shall:

1> retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS and clear that entry;

1> clear the variable CONFIGURATION_INCOMPLETE;

1> set the cause value in IE "failure cause" to "Configuration incomplete";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

5) The UE should set the variable UNSUPPORTED_CONFIGURATION to TRUE if the received message is not according to the UE capabilities.

References

- Conformance requirement 1, 2: TS 24.030, clause 4.1.1.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.1
- Conformance requirement 4: TS 25.331, clause 8.4.1.4a
- Conformance requirement 5: TS 25.331 clause 8.5.20

### 6.1.3.10.3 Test Purpose

To verify that the UE sends a MEASUREMENT CONTROL FAILURE message, after receiving a MEASUREMENT CONTROL message with IE "Method Type" set a value which is inconsistent with the UE positioning capabilities.

To verify that the UE set the "failure cause" IE to value "configuration incomplete" in the uplink MEASUREMENT CONTROL FAILURE message.

6.1.3.10.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Based Network Assisted GPS
- UE Assisted Network Assisted GPS
- UE supporting Mobile Terminated Location Request

Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke component set to notifyLocationAllowed.

The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result.

The SS sends a MEASUREMENT CONTROL message with "Method type" set to a value not supported by the UE as indicated in the "UE positioning capability" contained in the "UE radio access capability" (method not to be supported is UE-based OTDOA).

The UE sends a MEASUREMENT CONTROL FAILURE message with Failure Cause "Configuration Incomplete" or "unsupported configuration.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE notifies the user of the location request |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | SS | | | SS verifies that UE does not support UE-based OTDOA |
| 8 | <- | | MEASUREMENT CONTROL | IE "Method type" is set to a method not supported by the UE (UE-based OTDOA) |
| 9 | -> | | MEASUREMENT CONTROL FAILURE | Failure cause "Configuration Incomplete" or "Unsupported Configuration" |
| 10 | SS | | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

MEASUREMENT CONTROL (Step 8):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE-based |
| - Positioning methods | OTDOA |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Periodical reporting criteria |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Not present |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL FAILURE (Step 9)

| Information Element | Value/remark |
|---|---|
| RRC transaction identifier | Set to the same value of the same IE in the MEASUREMENT CONTROL message sent in Step 5 |
| Failure cause | Failure cause "Configuration Incomplete" or "Unsupported Configuration" |

#### 6.1.3.10.5 Test requirements

After step 5 the UE shall send a RELEASE COMPLETE message.

After step 8, the UE shall transmit MEASUREMENT CONTROL FAILURE message, stating the IE "failure cause" as "configuration incomplete". The UE shall not transmit any MEASUREMENT REPORT messages during the execution of this test case.

# 6.2 Assisted-GNSS Test Cases

6.2.1 Assisted GNSS Network Induced Tests

## 6.2.1.1 NI-LR Emergency Call: UE-Based A-GNSS

#### 6.2.1.1.1 Definition

This test case applies to all UEs supporting UE-Based GANSS or GNSS Location Service capabilities.

#### 6.2.1.1.2 Conformance requirements

1) A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call.

   When a user requests an emergency call establishment the UE will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment.

2) Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the UE sends a setup message to its peer entity. This setup message is

   - a SETUP message, if the call to be established is a basic call; and
   - an EMERGENCY SETUP message, if the call to be established is an emergency call.

3) If the IE "UE positioning GANSS reference time" is included, the UE shall:

   1> if the IE "GANSS Day" is included:

      2> store this IE in "UE positioning GANSS reference time" in variable UE_POSITIONING_GANSS_DATA and use it as the current GANSS day.

   1> store the IE "GANSS TOD" in the IE "UE positioning GANSS reference time" in variable UE_POSITIONING_GANSS_DATA and use it as an estimate of the GANSS Time-of-Day at the time of reception of the complete message containing the IE "GANSS TOD";

   NOTE: The UE does not need to apply any compensation on the GANSS Time-of-Day.

   1> if the IE "GANSS Time ID" is not included:

      2> use Galileo system time as a reference for GANSS-Time-of-Day.

   1> if the IE "GANSS Time ID" is included:

      2> use the system time indicated by this IE as a reference for GANSS-Time-of-Day.

4) If the IE "UE positioning GANSS reference UE position" is included, the UE shall:

1> store this IE in the IE "UE positioning GANSS reference UE position" in variable UE_POSITIONING_GANSS_DATA; and

1> use it as a priori knowledge of the approximate location of the UE.

5) If the IE "UE positioning GANSS time model" is included, the UE shall for each GANSS:

1> store the information in "UE positioning GANSS time model" in variable UE_POSITIONING_GANSS_DATA;

1> use the stored parameters to relate GANSS time for the GANSS indicated by "GANSS ID" to time reference indicated by IE "GNSS_TO_ID".

6) The UE shall when a measurement report is triggered:

1> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or the UE has been able to calculate a position in case of GPS or GANSS positioning or the UE has been able to calculate a position using a standalone positioning method:

2> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

3> if the UE supports the capability to provide the GANSS timing of the cell frames measurement;

3> if the IE "GANSS timing of Cell wanted" is not included, or included with each bit set to value zero:

4> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid.

3> if the UE does not support the capability to provide the GANSS timing of the cell:

4> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid;

4> include the IE "GANSS Time ID" to identify the GNSS system time.

3> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

4> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

5> if the UE has been able to calculate a 3-dimensional position:

6> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

5> if the UE has not been able to calculate a 3-dimensional position:

6> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

3> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

4> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

5> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

3> if any of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" is reported:

4> should calculate a value of the IE "Confidence", different from "0", as the probability that the UE is located within the uncertainty region of the one of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" that is reported.

NOTE: The value "0" of the IE "Confidence" is interpreted as "no information" by the UTRAN.

Reference(s):

- Conformance requirement 1: TS 24.008 clause 4.5.1.5.
- Conformance requirement 2: TS 24.008, clause 5.2.1.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.7.7.
- Conformance requirement 4: TS 25.331, clause 8.6.7.19.7.8.
- Conformance requirement 5: TS 25.331, clause 8.6.7.19.7.9.
- Conformance requirement 6: TS 25.331, clause 8.6.7.19.1b.

#### 6.2.1.1.3 Test Purpose

To verify when an emergency call is initiated by a UE, and the network performs a GANSS location request using the RRC measurement control procedure, then the UE responds with a Measurement Report containing UE location estimate.

#### 6.2.1.1.4 Method of Test

##### Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment (UE):
  - the UE is in state "MM idle" with valid TMSI and CKSN.

##### Related PICS/PIXIT Statements

- Emergency speech call
- UE Based Network Assisted GANSS
- UE Based Network Assisted GPS (Sub-tests 3 and 4)

##### Test procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE is made to initiate an emergency call.

After the call has been through-connected in both directions, the SS orders an A-GNSS positioning measurement using one or more (dependent on the Sub-Test) MEASUREMENT CONTROL messages. The last MEASUREMENT CONTROL message orders periodical reporting by sending a MEASUREMENT CONTROL message requesting periodical measurement reporting (1 report, interval 64s).

The UE then performs positioning measurements, calculates "UE Positioning Position Estimate Info" and responds with this in the RRC message MEASUREMENT REPORT.

Finally the SS clears the call.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | UE | | | The "emergency number" is entered. Number shall be one programmed in test USIM $EF_{ECC}$ (Emergency Call Codes), ref. 34.108 clause 8.3.2.21. |
| 2 | --> | | | UE establishes RRC procedure for emergency call.<br>Establishment cause: Emergency Call<br>SS checks that the UE capability includes "Network Assisted GANSS Support List" with "GANSS mode" set to "UE-based", and that the UE includes "Network Assisted GPS Support" for UE-based (Sub-Tests 3 and 4 only). |
| 3 | --> | | CM SERVICE REQUEST | The CM service type IE indicates "emergency call establishment". |
| 4 | <-- | | AUTHENTICATION REQUEST | IE Authentication Parameter AUTN shall be present in the message. |
| 5 | --> | | AUTHENTICATION RESPONSE | SRES specifies correct value. |
| 6 | | | | SS starts security procedure. |
| 7 | --> | | EMERGENCY SETUP | If the Bearer capability IE is not included the default UMTS AMR speech version shall be assumed. |
| 8 | <-- | | CALL PROCEEDING | |
| 9 | <-- | | ALERTING | |
| 10 | <-- | | | SS sets up the radio bearer with the rate indicated by the EMERGENCY SETUP message. |
| 11 | <-- | | CONNECT | |
| 12 | --> | | CONNECT ACKNOWLEDGE | |
| 13 | UE | | | The DTCH is through connected in both directions. |
| 14 | <-- | | MEASUREMENT CONTROL | All Sub-Tests |
| 14a | <-- | | MEASUREMENT CONTROL | Sub-Tests 2-4 only |
| 14b | <-- | | MEASUREMENT CONTROL | Sub-Test 4 only |
| 15 | --> | | MEASUREMENT REPORT | |
| 16 | <-- | | DISCONNECT | SS disconnects the call and associated radio bearer. |

Specific Message Contents

MEASUREMENT CONTROL (Step 14):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | For Sub-Test 1 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Tests 2,3,4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 14a):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | For Sub-Tests 2, 3 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Test 4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 14b):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 15):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | GPS or GANSS reference time only |
| - GPS TOW msec | Not checked |
| - GANSS TOD msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - Position Data | Not checked |
| - CHOICE *Velocity estimate* | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

#### 6.2.1.1.5 Test requirements

After step 12 the UE shall have through connected the DTCH in both directions.

After step 14, 14a, or 14b (dependent on Sub-Test) the UE shall respond with a MEASUREMENT REPORT message.

### 6.2.1.2 NI-LR Emergency call: UE-Assisted A-GNSS

#### 6.2.1.2.1 Definition

This test case applies to all UEs supporting UE-Assisted GANSS or GNSS Location Service capabilities.

#### 6.2.1.2.2 Conformance requirements

1) A MM connection for an emergency call may be established in all states of the mobility management sublayer which allow MM connection establishment for a normal originating call.

   When a user requests an emergency call establishment the UE will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment.

2) Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the UE sends a setup message to its peer entity. This setup message is

   - a SETUP message, if the call to be established is a basic call; and

   - an EMERGENCY SETUP message, if the call to be established is an emergency call.

3) The a measurement report is triggered:

   1> if the UE was UE shall when able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one satellite included in the

variable UE_POSITIONING_GANSS_DATA in case of GANSS positioning or one cell from the active set in case of CELL ID:

2> if the IE "Vertical Accuracy" is included:

3> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

2> if the IE "Positioning Methods" is set to "GPS" and if the IE "GANSS Positioning Methods" is not present or if the IE "GANSS Positioning Methods" is present indicating GPS allowed:

3> include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

4> if the UE supports the capability to provide the GPS timing of the cell frames measurement:

5> if the IE "GPS timing of Cell wanted" is set to FALSE:

7> include the IE "GPS TOW msec" and set it to the GPS TOW when the measurements included in the MEASUREMENT REPORT were valid;

7> include the IE "UE Positioning GPS Reference Time Uncertainty" and set it to the uncertainty of the GPS TOW when the measurements included in the MEASUREMENT REPORT were valid.

4> if the UE does not support the capability to provide the GPS timing of the cell:

5> include the IE "GPS TOW msec" and set it to the GPS TOW when the measurements included in the MEASUREMENT REPORT were valid;

5> include the IE "UE Positioning GPS Reference Time Uncertainty" and set it to the uncertainty of the GPS TOW when the measurements included in the MEASUREMENT REPORT were valid.

2> if the IE "Positioning Methods" is set to "GPS" and the IE "GANSS Positioning Methods" is present indicating other GNSS than GPS allowed and if any of these other GNSSs is measured:

3> include the IE "UE positioning GANSS measured results" in the measurement report and set the contents of the IE as follows:

4> if the UE supports the capability to provide the GANSS timing of the cell frames measurement:

5> if the IE "GANSS timing of Cell wanted" is not included, or included with each bit set to value zero and if IE "UE positioning GPS measured results" is not present:

6> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the measurements included in the MEASUREMENT REPORT were valid.

4> if the UE does not support the capability to provide the GANSS timing of the cell and if IE "UE positioning GPS measured results" is not present:

5> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the measurements included in the MEASUREMENT REPORT were valid.

4> if the UE supports the capability to perform GANSS measurements on multiple GANSS frequencies:

5> if the IE "GANSS Multi-frequency Measurement Requested" is included with one bit set to value one for a supported GANSS, and if any of these GANSS signals are measured:

6> include the IE "GANSS Signal Measurement Information" for each measured GANSS signal.

References

- Conformance requirement 1: TS 24.008 clause 4.5.1.5.

- Conformance requirement 2: TS 24.008, clause 5.2.1.
- Conformance requirement 3: TS 25.331, clause 8.6.7.19.1a.

#### 6.2.1.2.3 Test Purpose

To verify when an emergency call is initiated by a UE, and the network performs a GANSS location request using the RRC measurement control procedure, then the UE responds with a Measurement Report containing "UE positioning GANSS measured results" and "UE positioning GPS measured results" (Sub-tests 3 and 4).

#### 6.2.1.2.4 Method of Test

##### Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2.
- User Equipment (UE):
  - the UE is in state "MM idle" with valid TMSI and CKSN.

##### Related PICS/PIXIT Statements

- Emergency speech call
- UE Assisted Network Assisted GANSS
- UE Assisted Network Assisted GPS (Sub-tests 3 and 4)

##### Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE is made to initiate an emergency call.

After the call has been through-connected in both directions, the SS orders an A-GNSS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.4.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The UE then performs positioning measurements and responds with the RRC message MEASUREMENT REPORT.

Finally the SS clears the call.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | UE | | | The "emergency number" is entered. Number shall be one programmed in test USIM $EF_{ECC}$ (Emergency Call Codes), ref. 34.108 clause 8.3.2.21. |
| 2 | --> | | | UE establishes RRC procedure for emergency call.<br>Establishment cause: Emergency Call<br>SS checks that the UE capability includes "Network Assisted GANSS Support List" with "GANSS mode" set to "UE-assisted", and that the UE includes "Network Assisted GPS Support" for UE-assisted (Sub-Tests 3 and 4 only). |
| 3 | --> | | CM SERVICE REQUEST | The CM service type IE indicates "emergency call establishment". |
| 4 | <-- | | AUTHENTICATION REQUEST | IE Authentication Parameter AUTN shall be present in the message. |
| 5 | --> | | AUTHENTICATION RESPONSE | SRES specifies correct value. |
| 6 | SS | | | SS starts security procedure. |
| 7 | --> | | EMERGENCY SETUP | If the Bearer capability IE is not included the default UMTS AMR speech version shall be assumed. |
| 8 | <-- | | CALL PROCEEDING | |
| 9 | <-- | | ALERTING | |
| 10 | <-- | | | SS sets up the radio bearer with the rate indicated by the EMERGENCY SETUP message. |
| 11 | <-- | | CONNECT | |
| 12 | --> | | CONNECT ACKNOWLEDGE | |
| 13 | UE | | | The DTCH is through connected in both directions. |
| 14 | <-- | | MEASUREMENT CONTROL | |
| 15 | --> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 15a | <-- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 15, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.4.5. |
| 15b | --> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 15, this message contains the IE "UE positioning GANSS measured results" and "UE positioning GPS measured results" (Sub-tests 3 and 4). |
| 16 | <-- | | DISCONNECT | SS disconnects the call and associated radio bearer. |

Specific Message Contents

MEASUREMENT CONTROL (Step 14):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GNSS" in 4.4.3 |
| - UE positioning GANSS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GNSS" in 4.4.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 15 (Option 1) or 15b (Option 2))

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present for Sub-Test 3 and 4 |
| - UE positioning error | Not present |
| - UE positioning GANSS measured results | Present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

MEASUREMENT REPORT (Step 15 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| - Error reason | Assistance Data Missing |
| - GPS Additional Assistance Data Request | Not checked |
| - GANSS Additional Assistance Data Request | Not checked |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

MEASUREMENT CONTROL (Step 15a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.4.5 |
| - UE positioning GANSS assistance data | Set as specified in 4.4.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

#### 6.2.1.2.5 Test requirements

After step 12 the UE shall have through connected the DTCH in both directions.

After step 14 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results" and/or "UE positioning GANSS measured results".

### 6.2.2 Assisted GNSS Mobile Originated Tests

## 6.2.2.1 MO-LR Position Estimate: UE-Based A-GNSS

#### 6.2.2.1.1 Definition

This test case applies to all UEs supporting UE-Based GANSS or GNSS Location Service capabilities and providing a method to trigger an MO-LR request for a position estimate.

#### 6.2.21.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

2) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

3) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 2 and 3: TS 24.030, subclause 5.1.1

#### 6.2.2.1.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted UE-based GNSS.

#### 6.2.2.1.4 Method of Test

Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment (UE):
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI.

Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Based Network Assisted GPS (Sub-tests 3 and 4).
- Method of triggering an MO-LR request for a position estimate.

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request of type "locationEstimate".

The SS orders an A-GNSS positioning measurement using one or more (dependent on the Sub-Test) MEASUREMENT CONTROL messages.

The SS responds with a FACILITY message containing an MO-LR result.

When UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "locationEstimate". |
| 7 | <-- | | MEASUREMENT CONTROL | All Sub-Tests |
| 7a | <-- | | MEASUREMENT CONTROL | Sub-Tests 2-4 only |
| 7b | <-- | | MEASUREMENT CONTROL | Sub-Test 4 only |
| 8 | -> | | MEASUREMENT REPORT | |
| 9 | <- | | FACILITY | LCS MO-LR result message containing a location estimate |
| 10 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 11 | SS | | | The SS releases the RRC connection and the test case ends. |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Register message type | xx11 1011 (REGISTER) |
| Facility | Invoke=LCS-MOLR<br>molr-Type ->locationEstimate |
| SS version | Version 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | For Sub-Test 1 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Tests 2,3,4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 7a):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | For Sub-Tests 2, 3 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Test 4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 7b):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| - CHOICE *Reference time* | GPS or GANSS reference time only |
| - GPS TOW msec | Not checked |
| - GANSS TOD msec | Not checked |
| - CHOICE *Position estimate* | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' |
| - Position Data | Not checked |
| - CHOICE *Velocity estimate* | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

FACILITY (Step 9)

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Facility message type | xx11 1010 (FACILITY) |
| Facility | Return Result=LCS-MOLRRes<br>→ locationEstimate |

RELEASE COMPLETE (Step 10)

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Release Complete message type | xx10 1010 (RELEASE COMPLETE) |

#### 6.2.2.1.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate".

After step 7, the UE shall respond with a MEASUREMENT REPORT message.

After step 9, the UE shall send a RELEASE COMPLETE message.

## 6.2.2.2 MO-LR Position Estimate: UE-Assisted A-GNSS

### 6.2.2.2.1 Definition

This test case applies to all UEs supporting UE-Assisted GANSS or GNSS Location Service capabilities and providing a method to trigger an MO-LR request for a position estimate.

### 6.2.2.2.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

2) The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

3) After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 2 and 3: TS 24.030, subclause 5.1.1

### 6.2.2.2.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted UE-assisted GNSS.

### 6.2.2.2.4 Method of Test

#### Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment (UE):
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI.

#### Related PICS/PIXIT Statements

- UE Assisted Network Assisted GANSS.
- UE Assisted Network Assisted GPS (Sub-tests 3 and 4).
- Method of triggering an MO-LR request for a position estimate.

#### Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request of type "locationEstimate".

The SS orders an A-GNSS positioning measurement using a MEASUREMENT CONTROL message, including assistance data as specified in subclause 4.4.3. The UE may request additional assistance data by sending a MEASUREMENT REPORT message containing a positioning error indication with the IE "Error reason" set to "Assistance Data Missing". If the UE requests additional assistance data, the SS provides the requested assistance data in one or more MEASUREMENT CONTROL messages.

The SS responds with a FACILITY message containing an MO-LR result.

When UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "locationEstimate". |
| 7 | <- | | MEASUREMENT CONTROL | |
| 8 | -> | | MEASUREMENT REPORT | UE reports positioning measurement results (Option 1) or requests additional assistance data (Option 2). |
| 8a | <- | | MEASUREMENT CONTROL | If UE requested additional assistance data in step 8, SS provides the requested data in one or more MEASUREMENT CONTROL messages as specified in subclause 4.4.5. |
| 8b | -> | | MEASUREMENT REPORT | If UE requested additional assistance data in step 8, this message contains the IE "UE positioning GANSS measured results" and "UE positioning GPS measured results" (Sub-tests 3 and 4). |
| 9 | <- | | FACILITY | LCS MO-LR result message containing a location estimate |
| 10 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 11 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 6):

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Register message type | xx11 1011 (REGISTER) |
| Facility | Invoke=LCS-MOLR<br>molr-Type ->locationEstimate |
| SS version | Version 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GNSS" in 4.4.3 |
| - UE positioning GANSS assistance data | Set as specified for "Adequate assistance data for UE-assisted A-GNSS" in 4.4.3 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8 (Option 1) or 8b (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Present for Sub-Test 3 and 4 |
| - UE positioning error | Not present |
| - UE positioning GANSS measured results | Present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

MEASUREMENT REPORT (Step 8 (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | Assistance Data Missing |
| - GPS Additional Assistance Data Request | Not checked |
| - GANSS Additional Assistance Data Request | Not checked |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

MEASUREMENT CONTROL (Step 8a (Option 2)):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.4.5 |
| - UE positioning GANSS assistance data | Set as specified in 4.4.5 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

FACILITY (Step 9):

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Facility message type | xx11 1010 (FACILITY) |
| Facility | Return Result=LCS-MOLRRes<br>→ locationEstimate<br>Any values may be used. The SS shall not be required to calculate the value from the returned measurements. |

RELEASE COMPLETE (Step 10):

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Release Complete message type | xx10 1010 (RELEASE COMPLETE) |

#### 6.2.2.2.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate".

After step 7, the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning GPS measured results" and/or "UE positioning GANSS measured results".

After step 9, the UE shall send a RELEASE COMPLETE message.

### 6.2.2.3 MO-LR Position Estimate: UE-Based A-GNSS – Failure Not Enough Satellites

#### 6.2.2.3.1 Definition

This test case applies to all UEs supporting UE-Based GANSS or GNSS Location Service capabilities and providing a method to trigger an MO-LR request for a position estimate.

#### 6.2.2.3.2 Conformance requirements

1) The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

2) if the IE "Measurement command" has the value "modify":

2> for all IEs present in the MEASUREMENT CONTROL message:

3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GANSS assistance data" is present, for any of the optional IEs "UE positioning GANSS reference time", "UE positioning GANSS reference UE position", "UE positioning DGANSS corrections", "UE positioning GANSS ionospheric model", "UE positioning GANSS additional ionospheric model", "UE positioning GANSS UTC model", "UE positioning GANSS additional UTC models", "UE positioning GANSS reference measurement information", "UE positioning GANSS data bit assistance", "UE positioning GANSS Time model", "UE positioning GANSS real-time integrity", "UE positioning GANSS Earth orientation parameters", "UE positioning GANSS auxiliary information" that are present in the MEASUREMENT CONTROL message:

5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

3) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

1> if an update has been provided for this satellite:

2> act as specified in subclause 8.6.7.19.3.4.

If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

4) If the IE "UE positioning GANSS Navigation Model" is included, the UE shall:

1> for each GANSS:

2> for each satellite, the UE shall:

3> for IE "UE positioning GANSS clock model":

4> act as specified in subclause 8.6.7.19.7.4a.

3> for IE "UE positioning GANSS orbit model":

4> act as specified in subclause 8.6.7.19.7.4b.

5) If the IE "UE positioning GANSS clock model" is included, the UE shall:

1> for each GANSS:

2> update the variable UE_POSITIONING_GANSS_DATA as follows:

3> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GANSS Navigation Model" in the variable UE_POSITIONING_GANSS_DATA, possibly overwriting any existing information in this position.

2> act on these GANSS clock models in a manner similar to that specified in a relevant ICD.

6) If the IE "UE positioning GANSS orbit model" is included, for each satellite of each supported GNSS, the UE shall:

1> update the variable UE_POSITIONING_GANSS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GANSS Navigation Model" in the variable UE_POSITIONING_GANSS_DATA, possibly overwriting any existing information in this position..

1> act on these GANSS orbit models in a manner similar to that specified in a relevant ICD.

7) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or the UE has been able to calculate a position in case of GPS or GANSS positioning or the UE has been able to calculate a position using a standalone positioning method:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE supports the capability to perform the UE GPS timing of cell frames measurement:

5> if the IE "GPS timing of Cell wanted" is set to TRUE:

6> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

6> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD;

6> include the SFN when the position was determined;

6> include the IE "UE GPS timing of cell frames";

6> include the IE "UE Positioning GPS Reference Time Uncertainty".

5> if the IE "GPS timing of Cell wanted" is set to FALSE:

6> include the IE "GPS TOW msec" and set it to the GPS TOW when the position estimate was valid.

4> if the position was calculated with GPS; and

4> the UE does not support the capability to provide the GPS timing of the cell:

5> include the IE "GPS TOW msec" and set it to the GPS TOW when the position estimate was valid.

4> if the UE supports the capability to provide the GANSS timing of the cell frames measurement:

5> if the IE "GANSS timing of Cell wanted" is included with one bit set to value one for a supported GANSS:

6> perform the UE GANSS timing of cell frames measurement on the serving cell or on one cell of the active set;

6> include the IE "GANSS Time ID" to identify the GNSS system time;

6> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

6> include the IE "Reference SFN" and the IE "UE GANSS timing of cell frames".

5> if the IE "GANSS timing of Cell wanted" is not included, or included with each bit set to value zero:

6> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid.

4> if the UE does not support the capability to provide the GANSS timing of the cell:

5> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid;

5> include the IE "GANSS Time ID" to identify the GNSS system time.

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to value "0":

6> if the IE "Horizontal Accuracy" has been assigned a value "0":

7> may include IE "Ellipsoid point with altitude".

6> if the IE "Horizontal Accuracy" has been assigned a value unequal to "0"; and

6> if the UE has been able to calculate a 3-dimensional position

7> include IE "Ellipsoid point with altitude" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> may act as if IE "Vertical Accuracy" was not included in IE "UE positioning reporting quantity".

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

4> if any of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" is reported:

5> should calculate a value of the IE "Confidence", different from "0", as the probability that the UE is located within the uncertainty region of the one of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" that is reported.

NOTE: The value "0" of the IE "Confidence" is interpreted as "no information" by the UTRAN [57].

4> if IE "Velocity Requested" has been included in IE "UE positioning reporting quantity":

5> include IE "Velocity estimate" if supported and available.

2> if the UE was not able to calculate a position:

3> include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as specified in subclause 8.6.7.19.5.

8) The UE shall set the contents of the IE "UE positioning Error" as follows:

…

1> if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS" and the IE "GANSS Positioning Methods" is present:

2> if there were not enough GANSS satellites to be received:

3> set IE "Error reason" to "Not Enough GANSS Satellites".

2> if some GANSS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE:

4> include the IE "GANSS Additional Assistance Data Request".

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to FALSE:

4> not include the IE "GANSS Additional Assistance Data Request", and use the assistance data available for doing a positioning estimate.

9) If the network is unable to successfully fulfil the request received from the MS (e.g. to provide a location estimate or location assistance information), it shall clear the transaction by sending a RELEASE COMPLETE message containing a return error component. Error values are specified in 3GPP TS 24.080.

10) PositionMethodFailure: This error is returned by the network when the network is unable to obtain any of the location information requested or none of the information obtained satisfies the requested LCS QoS or if requested LCS assistance data could not be transferred or requested deciphering keys for broadcast assistance data could not be returned.

Reference(s):

- Conformance requirements 1 and 9: TS 24.030, subclause 5.1.1
- Conformance requirement 2: TS 25.331, subclause 8.4.1.3.
- Conformance requirement 3: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 4: TS 25.331, subclause 8.6.7.19.7.4
- Conformance requirement 5: TS 25.331, subclause 8.6..7.19.4a
- Conformance requirement 6: TS 25.331, subclause 8.6.7.19.4b
- Conformance requirement 7: TS 25.331, subclause 8.6.7.19.1b
- Conformance requirement 8: TS 25.331, subclause 8.6.7.19.1b
- Conformance requirement 9: TS 25.331, subclause 8.6.7.19.5
- Conformance requirement 10: TS 24.080, subclause 4.3.2.29

#### 6.2.2.3.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted UE-based GNSS when the MO-LR procedure fails due to failure of positioning method.

#### 6.2.2.3.4 Method of Test

##### Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellite Simulator is switched off
- User Equipment (UE):
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Based Network Assisted GPS (Sub-tests 3 and 4).
- Method of triggering an MO-LR request for a position estimate.

##### Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request of type "locationEstimate".

The SS orders an A-GNSS positioning measurement using one or more (dependent on the Sub-Test) MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message with a positioning error indication.

The SS sends a RELEASE COMPLETE message containing a return error component.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "locationEstimate". |
| 7 | <-- | | MEASUREMENT CONTROL | All Sub-Tests |
| 7a | <-- | | MEASUREMENT CONTROL | Sub-Tests 2-4 only |
| 7b | <-- | | MEASUREMENT CONTROL | Sub-Test 4 only |
| 8 | -> | | MEASUREMENT REPORT | Positioning error report "not enough GANSS satellites" or "not enough GPS satellites" (subtests 3 and 4 only) |
| 9 | SS | | | SS is unable to fulfil the MO-LR request |
| 10 | <- | | RELEASE COMPLETE | SS terminates the dialogue containing a return error component |
| 11 | SS | | | The SS releases the RRC connection and the test case ends. |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Register message type | xx11 1011 (REGISTER) |
| Facility | Invoke=LCS-MOLR<br>molr-Type ->locationEstimate |
| SS version | Version 1 or above |

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | For Sub-Test 1 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Tests 2,3,4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 7a):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | For Sub-Tests 2, 3 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Test 4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 7b):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | |
| - Error reason | notEnoughGANSS-Satellites or notEnoughGPS-Satellites (subtests 3 and 4 only) |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

RELEASE COMPLETE (Step 10)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |
| Facility | Return error = LCS-MOLR<br>Error -> positionMethodFailure |

#### 6.2.2.3.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "locationEstimate".

After step 7b, the UE shall respond with a MEASUREMENT REPORT message.

### 6.2.2.4 MO-LR Assistance Data: UE-Based or UE-Assisted A-GNSS - Success

#### 6.2.2.4.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GANSS or GNSS Location Service capabilities and providing a method to trigger an MO-LR request for a assistance data.

#### 6.2.2.4.2 Conformance requirements

1) The UE invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

2) The network shall send a FACILITY message to the UE containing a LCS-MOLR return result component.

3) After the last location request operation the UE shall terminate the dialogue by sending a RELEASE COMPLETE message.

Reference(s):

- Conformance requirements 1, 2 and 3: TS 24.030, subclause 5.1.1

#### 6.2.2.4.3 Test Purpose

To verify the UE behaviour at a mobile originated location request procedure using network-assisted UE-based or UE-assisted GNSS.

#### 6.2.2.4.4 Method of Test

##### Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2
- User Equipment (UE):
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI.

##### Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Based Network Assisted GPS (Sub-tests 3 and 4).
- UE Assisted Network Assisted GANSS.
- UE Assisted Network Assisted GPS (Sub-tests 3 and 4).
- Method of triggering an MO-LR request for assistance data.

##### Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request of type "AssistanceData".

The SS transmits an ASSISTANCE DATA delivery message with assistance data. When the assistance data delivery was successful, the SS sends a FACILITY message to the UE.

The SS responds with a FACILITY message containing an MO-LR result.

When the UE receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "AssistanceData". |
| 7 | <- | | ASSISTANCE DATA DELIVERY | The SS provides the requested data in one or more ASSISTANCE DATA DELIVERY messages as specified in subclause 4.4.5. |
| 8 | <- | | FACILITY | |
| 9 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 10 | SS | | | The SS releases the RRC connection and the test case ends. |

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | For sub-test 1 and 2:<br>Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->assistanceData<br>locationMethod -> assistedGANSS<br>ganssAssistanceData -> OCTET STRING<br>Octets 1 to 40 are coded in the same way as the octets 3 to 9+2n of Requested GANSS Data IE in 3GPP TS 49.031<br><br>For sub-test 3 and 4:<br>Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->assistanceData<br>locationMethod ->assistedGPSandGANSS<br>gpsAssistanceData -> OCTET STRING<br>Octets 1 to 38 are coded in the same way as octets 3 to 7+2n of Requested GPS Data IE in 3GPP TS 49.031<br>ganssAssistanceData -> OCTET STRING<br>Octets 1 to 40 are coded in the same way as the octets 3 to 9+2n of requested GANSS Data IE in 3GPP TS 49.031 |
| SS Version | Value 1 or above |

ASSISTANCE DATA DELIVERY (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| UE positioning OTDOA assistance data for UE-based | Not present |
| UE positioning GPS assistance data | Not present for sub-tests 1 and 2.<br>For sub-tests 3 and 4 set as specified in 4.4.5 |
| UE positioning GANSS assistance data | Set as specified in 4.4.5 |

FACILITY (Step 8)

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Facility message type | xx11 1010 (FACILITY) |
| Facility | Return Result=LCS-MOLRRes<br>→ EMPTY |

RELEASE COMPLETE (Step 9)

| Information element | Value/remark |
|---|---|
| Supplementary service protocol discriminator | 1011 (supplementary services (call independent)) |
| Transaction identifier | |
| Release Complete message type | xx10 1010 (RELEASE COMPLETE) |

#### 6.2.2.4.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "assistanceData".

After step 8, the UE shall send a RELEASE COMPLETE message.

### 6.2.2.5 MO-LR Assistance Data: UE-Based or UE-Assisted A-GNSS - Failure

#### 6.2.2.5.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GANSS or GNSS Location Service capabilities and providing a method to trigger an MO-LR request for assistance data.

#### 6.2.2.5.2 Conformance requirements

1) The UE invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

2) If the network is unable to successfully fulfil the request received from the UE (e.g. to provide a location estimate or location assistance information), it shall clear the transaction by sending a RELEASE COMPLETE message containing a return error component. Error values are specified in 3GPP TS 24.080.

3) PositionMethodFailure: This error is returned by the network when the network is unable to obtain any of the location information requested or none of the information obtained satisfies the requested LCS QoS or if requested LCS assistance data could not be transferred or requested deciphering keys for broadcast assistance data could not be returned.

Reference(s):

- Conformance requirements 1 and 2: TS 24.030, subclause 5.1.1

- Conformance requirement 3: TS 24.080, subclause 4.3.2.29

#### 6.2.2.5.3 Test Purpose

To verify the UE behaviour at a mobile originated location request for assistance data where the network is unable to provide the requested assistance data.

#### 6.2.2.5.4 Method of Test

Initial Conditions

- System Simulator (SS):

- 1 cell, default parameters.
- Satellites: As specified in 4.2

- User Equipment (UE):

  The UE shall begin the test with neither GPS nor GANSS assistance data stored.

  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI

### Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Based Network Assisted GPS (Sub-tests 3 and 4).
- UE Assisted Network Assisted GANSS.
- UE Assisted Network Assisted GPS (Sub-tests 3 and 4).
- Method of triggering an MO-LR request for assistance data.

### Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The UE invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering.

The UE invokes an MO-LR request of type "assistanceData".

The SS is unable to provide the requested assistance data.

The SS sends a RELEASE COMPLETE message containing a return error component.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | -> | | | The UE establishes an RRC connection for location service. The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originated High Priority Signalling". |
| 2 | -> | | CM SERVICE REQUEST | The CM service type IE indicates "call independent supplementary service" |
| 3 | <- | | AUTHENTICATION REQUEST | |
| 4 | -> | | AUTHENTICATION RESPONSE | |
| 5 | SS | | | The SS starts ciphering and integrity protection. |
| 6 | -> | | REGISTER | Call Independent SS containing Facility IE with an LCS MO-LR request of type "AssistanceData". |
| 7 | SS | | | SS is unable to provide the requested assistance data |
| 8 | <- | | RELEASE COMPLETE | SS terminates the dialogue containing a return error component |
| 9 | SS | | | The SS waits for 10 seconds to verify that the UE does not send a RELEASE COMPLETE message. |
| 10 | SS | | | The SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (xx11 1011) |
| Facility | Subtests 1 and 2:<br>Invoke = LCS-MOLR<br>LCS-MOLRArg<br>molr-Type ->assistanceData<br>locationMethod -> assistedGANSS<br>ganssAssistanceData -> OCTET STRING<br>Octets 1 to 40 are coded in the same way as octets 3 to 9+2n of Requested GANSS Data IE in 3GPP TS 49.031<br><br>Subtests 3 and 4:<br>Invoke = LCS-MOLR<br><br>LCS-MOLRArg<br><br>molr-Type ->assistanceData<br><br>LocationMethod ->assistedGPSandGANSS<br><br>gpsAssistanceData -> OCTET STRING<br>Octets 1 to 38 are coded in the same way as octets 3 to 7+2n of Requested GPS Data IE in 3GPP TS 49.031<br><br>ganssAssistanceData -> OCTET STRING<br>Octets 1 to 40 are coded in the same way as the octets 3 to 9+2n of requested GANSS Data IE in 3GPP TS 49.031 |
| SS version indicator | Value 1 or above |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |
| Facility | Return error = LCS-MOLR<br>Error -> positionMethodFailure |

#### 6.2.2.5.5 Test requirements

After step 5 the UE shall transmit a REGISTER message with an LCS MO-LR request with the IE "MOLR-Type" set to "assistanceData".

During step 9 the UE shall not send any RELEASE COMPLETE message.

6.2.3 Assisted GNSS Mobile Terminated Tests

### 6.2.3.1 MT-LR: UE-based or UE-Assisted A-GNSS – Request for additional assistance data/ Success

#### 6.2.3.1.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GANSS or GNSS Location Service capabilities.

#### 6.2.3.1.2 Conformance requirements

1) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GANSS assistance data" is present, for any of the optional IEs "UE positioning GANSS reference time", "UE positioning GANSS reference UE position", "UE positioning DGANSS corrections", "UE positioning GANSS ionospheric model", "UE positioning GANSS additional ionospheric model", "UE positioning GANSS UTC model", "UE positioning GANSS additional UTC models", "UE positioning GANSS reference measurement information", "UE positioning GANSS data bit assistance", "UE positioning GANSS Time model", "UE positioning GANSS real-time integrity", "UE positioning GANSS Earth orientation parameters", "UE positioning GANSS auxiliary information" that are present in the MEASUREMENT CONTROL message:

            5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

            5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

2) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

   1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

1> if an update has been provided for this satellite:

2> act as specified in subclause 8.6.7.19.3.4.

If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

3) If the IE "UE positioning GANSS Navigation Model" is included, the UE shall:

1> for each GANSS:

2> for each satellite, the UE shall:

3> for IE "UE positioning GANSS clock model":

4> act as specified in subclause 8.6.7.19.7.4a.

3> for IE "UE positioning GANSS orbit model":

4> act as specified in subclause 8.6.7.19.7.4b.

4) If the IE "UE positioning GANSS clock model" is included, the UE shall:

1> for each GANSS:

2> update the variable UE_POSITIONING_GANSS_DATA as follows:

3> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GANSS Navigation Model" in the variable UE_POSITIONING_GANSS_DATA, possibly overwriting any existing information in this position.

2> act on these GANSS clock models in a manner similar to that specified in a relevant ICD.

5) If the IE "UE positioning GANSS orbit model" is included, for each satellite of each supported GNSS, the UE shall:

1> update the variable UE_POSITIONING_GANSS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GANSS Navigation Model" in the variable UE_POSITIONING_GANSS_DATA, possibly overwriting any existing information in this position..

1> act on these GANSS orbit models in a manner similar to that specified in a relevant ICD.

6) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or the UE has been able to calculate a position in case of GPS or GANSS positioning or the UE has been able to calculate a position using a standalone positioning method:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE supports the capability to perform the UE GPS timing of cell frames measurement:

5> if the IE "GPS timing of Cell wanted" is set to TRUE:

6> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

6> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD;

6> include the SFN when the position was determined;

6> include the IE "UE GPS timing of cell frames";

6> include the IE "UE Positioning GPS Reference Time Uncertainty".

5> if the IE "GPS timing of Cell wanted" is set to FALSE:

6> include the IE "GPS TOW msec" and set it to the GPS TOW when the position estimate was valid.

4> if the position was calculated with GPS; and

4> the UE does not support the capability to provide the GPS timing of the cell:

5> include the IE "GPS TOW msec" and set it to the GPS TOW when the position estimate was valid.

4> if the UE supports the capability to provide the GANSS timing of the cell frames measurement:

5> if the IE "GANSS timing of Cell wanted" is included with one bit set to value one for a supported GANSS:

6> perform the UE GANSS timing of cell frames measurement on the serving cell or on one cell of the active set;

6> include the IE "GANSS Time ID" to identify the GNSS system time;

6> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

6> include the IE "Reference SFN" and the IE "UE GANSS timing of cell frames".

5> if the IE "GANSS timing of Cell wanted" is not included, or included with each bit set to value zero:

6> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid.

4> if the UE does not support the capability to provide the GANSS timing of the cell:

5> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid;

5> include the IE "GANSS Time ID" to identify the GNSS system time.

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to value "0":

6> if the IE "Horizontal Accuracy" has been assigned a value "0":

7> may include IE "Ellipsoid point with altitude".

6> if the IE "Horizontal Accuracy" has been assigned a value unequal to "0"; and

6> if the UE has been able to calculate a 3-dimensional position

7> include IE "Ellipsoid point with altitude" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> may act as if IE "Vertical Accuracy" was not included in IE "UE positioning reporting quantity".

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

4> if any of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" is reported:

5> should calculate a value of the IE "Confidence", different from "0", as the probability that the UE is located within the uncertainty region of the one of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" that is reported.

NOTE: The value "0" of the IE "Confidence" is interpreted as "no information" by the UTRAN [57].

4> if IE "Velocity Requested" has been included in IE "UE positioning reporting quantity":

5> include IE "Velocity estimate" if supported and available.

2> if the UE was not able to calculate a position:

3> include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as specified in subclause 8.6.7.19.5.

7) The UE shall:

1> when a measurement report is triggered:

2> if the UE was able to perform measurements on at least one neighbour cell included in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED in case of OTDOA or one satellite included in the variable UE_POSITIONING_GPS_DATA in case of GPS positioning or one cell from the active set in case of CELL ID:

3> if the IE "Vertical Accuracy" is included:

4> interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

if the IE "Positioning Methods" is set to "GPS" and the IE "GANSS Positioning Methods" is present indicating other GNSS than GPS allowed and if any of these other GNSSs is measured:

4> include the IE "UE positioning GANSS measured results" in the measurement report and set the contents of the IE as follows:

5> if the UE supports the capability to provide the GANSS timing of the cell frames measurement:

6> if the IE "GANSS timing of Cell wanted" is included with one bit set to value one for a supported GANSS and if IE "UE GPS timing of cell frames" is not present:

7> perform the UE GANSS timing of cell frames measurement on the serving cell or on one cell of the active set;

7> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

7> include the IE "Reference SFN" and the IE "UE GANSS timing of cell frames".

6> if the IE "GANSS timing of Cell wanted" is not included, or included with each bit set to value zero and if IE "UE positioning GPS measured results" is not present:

7> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the measurements included in the MEASUREMENT REPORT were valid.

5> if the UE does not support the capability to provide the GANSS timing of the cell and if IE "UE positioning GPS measured results" is not present:

6> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the measurements included in the MEASUREMENT REPORT were valid.

5> if the UE supports the capability to provide the GANSS carrier-phase measurements:

6> if the IE "GANSS Carrier-Phase Measurement Requested" is included with one bit set to value one for a supported GANSS:

7> include the IE "Carrier Quality Indication" and include the IE "ADR".

5> if the UE supports the capability to perform GANSS measurements on multiple GANSS frequencies:

6> if the IE "GANSS Multi-frequency Measurement Requested" is included with one bit set to value one for a supported GANSS, and if any of these GANSS signals are measured:

7> include the IE "GANSS Signal Measurement Information" for each measured GANSS signal.

8) 1> if the UE is unable to report the requested measurement results due to missing GPS assistance data:

2> the UE may at anytime send a measurement report containing the IE "UE positioning error" and set the contents of this IE as specified in subclause 8.6.7.19.5.

2> after sending the measurement report, the UE shall not send another measurement report to request the same GPS assistance data for at least 20s. This requirement does not apply after release of the current RRC connection.

1> if the UE is unable to report the requested measurement results due to missing GANSS assistance data:

2> the UE may at anytime send a measurement report containing the IE "UE positioning error" and set the contents of this IE as specified in subclause 8.6.7.19.5;

2> after sending the measurement report, the UE shall not send another measurement report to request the same GANSS assistance data for at least 20s. This requirement does not apply after release of the current RRC connection.

9) The UE shall set the contents of the IE "UE positioning Error" as follows:

…

1> if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS" and the IE "GANSS Positioning Methods" is present:

2> if there were not enough GANSS satellites to be received:

3> set IE "Error reason" to "Not Enough GANSS Satellites".

2> if some GANSS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE:

4> include the IE "GANSS Additional Assistance Data Request".

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to FALSE:

4> not include the IE "GANSS Additional Assistance Data Request", and use the assistance data available for doing a positioning estimate.

Reference(s):

- Conformance requirement 1: TS 25.331, subclause 8.4.1.3.
- Conformance requirement 2: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 3: TS 25.331, subclause 8.6.7.19.7.4
- Conformance requirement 4: TS 25.331, subclause 8.6.7.19.7.4a
- Conformance requirement 5: TS 25.331, subclause 8.6.7.19.7.4b
- Conformance requirement 6: TS 25.331, subclause 8.6.7.19.1b
- Conformance requirement 7: TS 25.331, subclause 8.6.7.19.1a
- Conformance requirement 8: TS 25.331, subclause 8.6.7.19.1a, 8.6.7.19.1b
- Conformance requirement 9: TS 25.331, subclause 8.6.7.19.5

#### 6.2.3.1.3 Test Purpose

To verify the UE's behaviour in a mobile-terminated location request procedure using UE-based or UE-assisted A-GNSS with assistance data from the network.

To verify that the UE in CELL_DCH state accepts assistance data received in multiple MEASUREMENT CONTROL messages.

To verify that the UE includes the IE "GPS Additional Assistance Data Request" or "GANSS Additional Assistance Data Request" to request assistance data when it does not have enough assistance data.

#### 6.2.3.1.4 Method of Test

Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellites: As specified in 4.2.
- User Equipment (UE):
  - The UE is in state "MM idle" with valid TMSI and CKSN.
  - The UE is in state "PMM idle" with valid P-TMSI.
  - The UE shall begin the test with no GPS and GANSS assistance data stored.

Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Assisted Network Assisted GANSS

- UE Based Network Assisted GPS (Sub-tests 3 and 4).
- UE Assisted Network Assisted GPS (Sub-tests 3 and 4).
- Method of clearing stored GPS/GANSS assistance data.

### Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The stored GPS/GANSS assistance data in the UE shall be cleared.

The SS initiates authentication and ciphering and orders a positioning measurement using a MEASUREMENT CONTROL message including no assistance data.
The UE sends a MEASUREMENT REPORT message to report a positioning error, requesting further assistance data.
The SS response with one or more MEASUREMENT CONTROL messages that include the requested assistance data and instructs the UE not to repeat the request for assistance data. The final MEASUREMENT CONTROL message orders periodic reporting.

The UE performs positioning measurements and responds with a MEASUREMENT REPORT message including the IE "UE Positioning Position Estimate Info" in case of UE-based, or including the IE "UE positioning GANSS measured results" and/or "UE positioning GPS measured results" in case of UE-assisted.

### Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <- | | AUTHENTICATION REQUEST | |
| 2 | -> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | The SS starts ciphering and integrity protection. |
| 4 | | | Void | |
| 5 | | | Void | |
| 6 | | | Void | |
| 7 | <-- | | MEASUREMENT CONTROL | No assistance data, and "Additional Assistance Data Request" IE set to TRUE. |
| 8 | -> | | MEASUREMENT REPORT | Positioning error report 'Assistance Data Missing' |
| 9 | <- | | MEASUREMENT CONTROL | The SS provides the requested data in one or more MEASUREMENT CONTROL messages. The last message contains:<br>Reporting mode: Periodical reporting<br>Amount of reporting: 1<br>Reporting interval: 64000 |
| 10 | --> | | MEASUREMENT REPORT | Measurement report message containing UE position estimate (UE-based), or IE "UE positioning GANSS measured results" and/or "UE positioning GPS measured results'' (UE-assisted). |
| 11 | SS | | | The SS releases the RRC connection and the test case ends. |

Specific Message Contents

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| Measurement Information Elements | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based or UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | TRUE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for "Inadequate assistance data for UE-based A-GNSS" in 4.4.2<br>or<br>"Inadequate assistance data for UE-assisted A-GNSS" in 4.4.4 |
| - UE positioning GANSS assistance data | Set as specified for "Inadequate assistance data for UE-based A-GNSS" in 4.4.2<br>or<br>"Inadequate assistance data for UE-assisted A-GNSS" in 4.4.4 |
| Physical Channel Information Elements | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8)

| Information element | Value/remark |
|---|---|
| Measurement Information Elements | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| - Error reason | Assistance Data Missing |
| -GPS additional assistance data requested | Sub-tests 3 and 4 |
| -Almanac | Present, if requested by UE |
| -UTC model | Present, if requested by UE |
| -Ionospheric model | Present, if requested by UE |
| -Navigation model | Present, if requested by UE |
| -DGPS corrections | Present, if requested by UE |
| -Reference location | Present, if requested by UE |
| -Reference time | Present, if requested by UE |
| -Acquisition assistance | Present, if requested by UE |
| -Real-time integrity | Present, if requested by UE |
| -Navigation model additional data | Present, if requested by UE |
| -GANSS additional assistance data requested | Sub-tests 1, 2, 4 |
| -GANSS Reference time | Present, if requested by UE |
| -Reference location | Present, if requested by UE |
| -GANSS Ionospheric model | Present, if requested by UE |
| -GANSS Additional Ionospheric Model for Data ID = ‘00’ | Present, if requested by UE |
| -GANSS Additional Ionospheric Model for Data ID = ‘11’ | Present, if requested by UE |
| -GANSS Earth orientation parameters | Present, if requested by UE |
| -GANSS Real-time integrity | Present, if requested by UE |
| -GANSS Almanac | Present, if requested by UE |
| -GANSS Time Model | Present, if requested by UE |
| -GANSS Ephemeris Extension Check | Present, if requested by UE |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

MEASUREMENT CONTROL (Step 9)

| Information element | Value/remark |
|---|---|
| Measurement Information Elements | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE *Measurement type* | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based or UE assisted |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-test 1: bit 5 = 1<br>Sub-test 2: bit 1 = 1<br>Sub-test 3: bit 0 an 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE *Reporting criteria* | Set as required according to position in sequence of messages |
| - Periodical reporting criteria | Set as required according to position in sequence of messages |
| - Amount of reporting | Set as required according to position in sequence of messages |
| - Reporting interval | Set as required according to position in sequence of messages |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified in 4.4.5 |
| - UE positioning GANSS assistance data | Set as specified in 4.4.5 |
| Physical Channel Information Elements | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 10)

| Information element | Value/remark |
|---|---|
| Measurement Information Elements | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE *Measurement* | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | |
| -CHOICE Position estimate | One of 'Ellipsoid point with uncertainty Circle' or 'Ellipsoid point with uncertainty Ellipse' or 'Ellipsoid point with altitude and uncertainty Ellipsoid' (UE-based) |
| - UE positioning GPS measured results | Present for UE-assisted (Sub-Tests 3 & 4) |
| - UE positioning error | Not present |
| - UE positioning GANSS measured results | Present for UE-assisted. |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

#### 6.2.3.1.5 Test requirements

After step 7 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning error", with "Error reason" set to "Assistance Data Missing".

After step 9 the UE shall send a MEASUREMENT REPORT message containing a valid UE position estimate (UE-based) or GANSS and/or GPS measurements (UE-assisted).

### 6.2.3.2 MT-LR Position Estimate: UE-Based A-GNSS – Failure Not Enough Satellites

#### 6.2.3.2.1 Definition

This test case applies to all UEs supporting UE-Based GANSS or GNSS Location Service capabilities.

#### 6.2.3.2.2 Conformance requirements

1) if the IE "Measurement command" has the value "modify":

   2> for all IEs present in the MEASUREMENT CONTROL message:

      3> if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GPS assistance data" is present, for any of the optional IEs "UE positioning GPS reference time", "UE positioning GPS reference UE position", "UE positioning GPS DGPS corrections", "UE positioning GPS ionospheric model", "UE positioning GPS UTC model", "UE positioning GPS acquisition assistance", "UE positioning GPS real-time integrity" that are present in the MEASUREMENT CONTROL message:

         4> if measurement type is set to "UE positioning measurement" and the IE "UE positioning GANSS assistance data" is present, for any of the optional IEs "UE positioning GANSS reference time", "UE positioning GANSS reference UE position", "UE positioning DGANSS corrections", "UE positioning GANSS ionospheric model", "UE positioning GANSS additional ionospheric model", "UE

positioning GANSS UTC model", "UE positioning GANSS additional UTC models", "UE positioning GANSS reference measurement information", "UE positioning GANSS data bit assistance", "UE positioning GANSS Time model", "UE positioning GANSS real-time integrity", "UE positioning GANSS Earth orientation parameters", "UE positioning GANSS auxiliary information" that are present in the MEASUREMENT CONTROL message:

5> replace all instances of the IEs listed above (and all their children) stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the IEs received in the MEASUREMENT CONTROL message;

5> leave all other stored information elements unchanged in the variable MEASUREMENT_IDENTITY.

2) If the IE "UE positioning GPS Navigation Model" is included, for each satellite, the UE shall:

1> use IE "Satellite Status" to determine if an update of IE "UE positioning GPS Ephemeris and Clock Correction parameters" has been provided for the satellite indicated by the IE "SatID";

1> if an update has been provided for this satellite:

2> act as specified in subclause 8.6.7.19.3.4.

If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

1> act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

3) If the IE "UE positioning GANSS Navigation Model" is included, the UE shall:

1> for each GANSS:

2> for each satellite, the UE shall:

3> for IE "UE positioning GANSS clock model":

4> act as specified in subclause 8.6.7.19.7.4a.

3> for IE "UE positioning GANSS orbit model":

4> act as specified in subclause 8.6.7.19.7.4b.

4) If the IE "UE positioning GANSS clock model" is included, the UE shall:

1> for each GANSS:

2> update the variable UE_POSITIONING_GANSS_DATA as follows:

3> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GANSS Navigation Model" in the variable UE_POSITIONING_GANSS_DATA, possibly overwriting any existing information in this position.

2> act on these GANSS clock models in a manner similar to that specified in a relevant ICD.

5) If the IE "UE positioning GANSS orbit model" is included, for each satellite of each supported GNSS, the UE shall:

1> update the variable UE_POSITIONING_GANSS_DATA as follows:

2> store this IE at the position indicated by the IE "Sat ID" in the IE "UE positioning GANSS Navigation Model" in the variable UE_POSITIONING_GANSS_DATA, possibly overwriting any existing information in this position..

1> act on these GANSS orbit models in a manner similar to that specified in a relevant ICD.

6) The UE shall when a measurement report is triggered:

2> if the UE has been able to calculate a position after performing measurements on the cells included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED in case of OTDOA or the UE has been able to calculate a position in case of GPS or GANSS positioning or the UE has been able to calculate a position using a standalone positioning method:

3> include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

4> if the UE supports the capability to perform the UE GPS timing of cell frames measurement:

5> if the IE "GPS timing of Cell wanted" is set to TRUE:

6> perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

6> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD;

6> include the SFN when the position was determined;

6> include the IE "UE GPS timing of cell frames";

6> include the IE "UE Positioning GPS Reference Time Uncertainty".

5> if the IE "GPS timing of Cell wanted" is set to FALSE:

6> include the IE "GPS TOW msec" and set it to the GPS TOW when the position estimate was valid.

4> if the position was calculated with GPS; and

4> the UE does not support the capability to provide the GPS timing of the cell:

5> include the IE "GPS TOW msec" and set it to the GPS TOW when the position estimate was valid.

4> if the UE supports the capability to provide the GANSS timing of the cell frames measurement:

5> if the IE "GANSS timing of Cell wanted" is included with one bit set to value one for a supported GANSS:

6> perform the UE GANSS timing of cell frames measurement on the serving cell or on one cell of the active set;

6> include the IE "GANSS Time ID" to identify the GNSS system time;

6> include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

6> include the IE "Reference SFN" and the IE "UE GANSS timing of cell frames".

5> if the IE "GANSS timing of Cell wanted" is not included, or included with each bit set to value zero:

6> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid.

4> if the UE does not support the capability to provide the GANSS timing of the cell:

5> include the IE "GANSS TOD msec" and set it to the GANSS TOD when the position estimate was valid;

5> include the IE "GANSS Time ID" to identify the GNSS system time.

4> if IE "Vertical Accuracy" has been included in IE "UE positioning reporting quantity":

5> if the IE "Vertical Accuracy" has been assigned to value "0":

6> if the IE "Horizontal Accuracy" has been assigned a value "0":

7> may include IE "Ellipsoid point with altitude".

6> if the IE "Horizontal Accuracy" has been assigned a value unequal to "0"; and

6> if the UE has been able to calculate a 3-dimensional position

7> include IE "Ellipsoid point with altitude" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> may act as if IE "Vertical Accuracy" was not included in IE "UE positioning reporting quantity".

5> if the IE "Vertical Accuracy" has been assigned to a value unequal to "0":

6> if the UE has been able to calculate a 3-dimensional position:

7> include IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

6> if the UE has not been able to calculate a 3-dimensional position:

7> act as if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity".

4> if IE "Vertical Accuracy" has not been included in IE "UE positioning reporting quantity":

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to value "0":

6> may include IE "Ellipsoid point".

5> if IE "Horizontal Accuracy" in IE "UE positioning reporting quantity" has been assigned to a value unequal to 0:

6> include either IE "Ellipsoid point with uncertainty circle" or IE "Ellipsoid point with uncertainty ellipse" or IE "Ellipsoid point with altitude and uncertainty ellipsoid" as the position estimate.

4> if any of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" is reported:

5> should calculate a value of the IE "Confidence", different from "0", as the probability that the UE is located within the uncertainty region of the one of the IEs "Ellipsoid point with uncertainty ellipse" or "Ellipsoid point with altitude and uncertainty ellipsoid" that is reported.

NOTE: The value "0" of the IE "Confidence" is interpreted as "no information" by the UTRAN [57].

4> if IE "Velocity Requested" has been included in IE "UE positioning reporting quantity":

5> include IE "Velocity estimate" if supported and available.

2> if the UE was not able to calculate a position:

3> include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as specified in subclause 8.6.7.19.5.

7) The UE shall set the contents of the IE "UE positioning Error" as follows:

…

1> if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS" and the IE "GANSS Positioning Methods" is present:

2> if there were not enough GANSS satellites to be received:

3> set IE "Error reason" to "Not Enough GANSS Satellites".

2> if some GANSS assistance data was missing:

3> set IE "Error reason" to "Assistance Data Missing"; and

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE:

4> include the IE "GANSS Additional Assistance Data Request".

3> if the IE "Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to FALSE:

4> not include the IE "GANSS Additional Assistance Data Request", and use the assistance data available for doing a positioning estimate.

Reference(s):

- Conformance requirement 1: TS 25.331, subclause 8.4.1.3.
- Conformance requirement 2: TS 25.331, subclauses 8.6.7.19.3.3a, 8.6.7.19.3.4.
- Conformance requirement 3: TS 25.331, subclause 8.6.7.19.7.4
- Conformance requirement 4: TS 25.331, subclause 8.6..7.19.4a
- Conformance requirement 5: TS 25.331, subclause 8.6.7.19.4b
- Conformance requirement 6: TS 25.331, subclause 8.6.7.19.1b
- Conformance requirement 7: TS 25.331, subclause 8.6.7.19.5

#### 6.2.3.2.3 Test Purpose

To verify the UE behaviour at a mobile terminated location request procedure using network-assisted UE-based GNSS when the MT-LR procedure fails due to failure of positioning method.

To verify that the UE in CELL_DCH state accepts assistance data received in multiple MEASUREMENT CONTROL messages.

To verify that the UE sets the IE Error Reason in ‘UE Positioning Error’ to ‘Not Enough GANSS Satellites’ when it does not receive enough satellite signals to compute a position.

#### 6.2.3.2.4 Method of Test

Initial Conditions

- System Simulator (SS):
  - 1 cell, default parameters.
  - Satellite Simulator is switched off.
- User Equipment (UE):
  - State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Based Network Assisted GPS (Sub-tests 3 and 4).

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported GNSS |
|---|---|
| 1 | UE supporting A-GLONASS only |
| 2 | UE supporting A-Galileo only |
| 3 | UE supporting A-GPS and Modernized GPS only |
| 4 | UE supporting A-GPS(1) and A-GLONASS only |
| NOTE 1: "A-GPS" includes Modernized GPS if supported by the UE. | |

The SS initiates authentication and ciphering and orders an A-GNSS positioning measurement using one or more (dependent on the sub-test) MEASUREMENT CONTROL messages.

The UE sends a MEASUREMENT REPORT message reporting a positioning error for not enough satellite signal.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <- | | AUTHENTICATION REQUEST | |
| 2 | -> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | | | Void | |
| 5 | | | Void | |
| 6 | | | Void | |
| 7 | <-- | | MEASUREMENT CONTROL | All Sub-Tests |
| 7a | <-- | | MEASUREMENT CONTROL | Sub-Tests 2-4 only |
| 7b | <-- | | MEASUREMENT CONTROL | Sub-Test 4 only |
| 8 | -> | | MEASUREMENT REPORT | Positioning error report ‘not enough satellites’ |
| 9 | SS | | | The SS releases the RRC connection and the test case ends. |

Specific Message Contents

MEASUREMENT CONTROL (Step 7):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Setup |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE Measurement type | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 1: bit 5 = 1<br>Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE Reporting criteria | |
| - Periodical reporting criteria | For Sub-Test 1 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Tests 2,3,4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the first MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 7a):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE Measurement type | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 2: bit 1 = 1<br>Sub-Test 3: bit 0 and 3 = 1<br>Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE Reporting criteria | |
| - Periodical reporting criteria | For Sub-Tests 2, 3 only |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - No reporting | For Sub-Test 4 only |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the second MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT CONTROL (Step 7b):

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measurement Command | Modify |
| Measurement Reporting Mode | |
| - Measurement report transfer mode | Acknowledged mode RLC |
| - Periodical reporting / Event trigger reporting mode | Periodical reporting |
| Additional Measurements List | Not present |
| CHOICE Measurement type | UE positioning measurement |
| - UE positioning measurement | |
| - UE positioning reporting quantity | |
| - Method type | UE based |
| - Positioning methods | GPS |
| - Response time | 128 |
| - Horizontal accuracy | 127 |
| - Vertical accuracy | 127 |
| - GPS timing of cell wanted | FALSE |
| - Multiple sets | FALSE |
| - Additional assistance data request | FALSE |
| - Environmental characterization | Not present |
| - Velocity Requested | Not present |
| - GANSS Positioning Method | Sub-Test 4: bit 0 and 5 = 1 |
| - GANSS timing of cell wanted | Not present |
| - GANSS Carrier-Phase Measurement Requested | Not present |
| - GANSS Multi-frequency Measurement Requested | Set according to UE capabilities |
| - Measurement validity | |
| - UE state | All states |
| - CHOICE Reporting criteria | |
| - Periodical reporting criteria | |
| - Amount of reporting | 1 |
| - Reporting interval | 64000 |
| - UE pos OTDOA assistance data for UE-assisted | Not present |
| - UE pos OTDOA assistance data for UE-based | Not present |
| - UE positioning GPS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| - UE positioning GANSS assistance data | Set as specified for the third MEASUREMENT CONTROL message for "Adequate assistance data for UE-based A-GNSS" in 4.4.1 |
| **Physical Channel Information Elements** | |
| DPCH compressed mode status info | Not present |

MEASUREMENT REPORT (Step 8)

| Information element | Value/remark |
|---|---|
| **Measurement Information Elements** | |
| Measurement Identity | 10 |
| Measured Results | |
| - CHOICE Measurement | UE positioning measured results |
| - UE positioning measured results | |
| - UE positioning OTDOA measured results | Not present |
| - UE positioning position estimate info | Not present |
| - UE positioning GPS measured results | Not present |
| - UE positioning error | Not present |
| - Error reason | notEnoughGANSS-Satellites or notEnoughGPS-Satellites (subtests 3 and 4 only) |
| - UE positioning GANSS measured results | Not present |
| Measured Results on secondary UL frequency | Not present |
| Measured Results on RACH | Not present |
| Additional Measured Results | Not present |
| Additional Measured results on secondary UL frequency | Not present |
| Event Results | Not present |
| Event results on secondary UL frequency | Not present |
| Inter-RAT cell info indication | Not present |
| E-UTRA Measured Results | Not present |
| E-UTRA Event Results | Not present |
| CSG Proximity Indication | Not present |

#### 6.2.3.2.5 Test requirements

After step 7 the UE shall send a MEASUREMENT REPORT message containing the IE "UE positioning error", with "Error reason" set to "Not Enough Satellites".

### 6.2.3.3 Location Notification

#### 6.2.3.3.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GANSS or GNSS Location Service capabilities and LCS value added location request notification capability.

#### 6.2.3.3.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

In the case of location notification no response is required from the UE, the UE shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

References

- Conformance requirement 1: TS 24.030, clause 4.1.1

#### 6.2.3.3.3 Test Purpose

To verify that when the UE receives a REGISTER message during an established CS call, containing a LCS Location Notification Invoke component set to NotifyLocationAllowed, the UE notifies the UE user of the location request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

6.2.3.3.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Assisted Network Assisted GANSS.
- UE supporting LCS value added location request notification capability.

Test Procedure

The SS initiates authentication and ciphering and sends an SS REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyLocationAllowed. The UE notifies the UE user of the location request. The UE then responds with a RELEASE COMPLETE message containing a LocationNotification return result to terminate the dialogue.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <- | | AUTHENTICATION REQUEST | |
| 2 | -> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed |
| 5 | UE | | | The UE notifies the UE user of the location request |
| 6 | -> | | RELEASE COMPLETE | The UE terminates the dialogue |
| 7 | SS | | | SS releases the RRC connection and the test case ends |

Specific Message Contents

REGISTER (Step 4)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator<br>Transaction identifier<br>Message type<br>Facility | Call Independent SS message (1011)<br><br>REGISTER (0011 1011)<br>Invoke = lcs-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyLocationAllowed,<br>locationType -> current Location ,<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 6)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = lcs-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

#### 6.2.3.3.5 Test requirements

After step 4 the UE shall notify the UE user of the location request.

After step 5 the UE shall send a RELEASE COMPLETE message.

### 6.2.3.4 Privacy Verification - Location Allowed if No Response

#### 6.2.3.4.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GANSS or GNSS Location Service capabilities and LCS value added location request notification capability.

#### 6.2.3.4.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In case of privacy verification the MS shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

3) If the timer expires in the network before any response from the MS (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in GSM 03.71 for GSM and TS 23.171 for UMTS (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

References

- Conformance requirement 1, 2 and 3: TS 24.030, clause 4.1.1

#### 6.2.3.4.3 Test Purpose

To verify that when the UE receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the UE notifies the UE user of the location request and indicates that the default response is location allowed if no response and providing the opportunity to accept or deny the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied or permissionGranted as appropriate.

#### 6.2.3.4.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Assisted Network Assisted GANSS.
- UE supporting LCS value added location request notification capability.
- px_UeLcsNotification: value for UE LCS Notification timeout timer.

Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The UE notifies the UE user of the location request with the option to accept or deny the request and an indication that location will be allowed if no user response is received.

The user accepts the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The UE notifies the UE user of the location request with the option to accept or deny the request and an indication that location will be allowed if no user response is received.

The user denies the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse.

The UE notifies the UE user of the location request with the option to accept or deny the request and an indication that location will be allowed if no user response is received.

The user ignores the location request by taking no action, allowing the verification process to time-out.

The SS send a RELEASE COMPLETE.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 5 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 6 | UE | | | The UE notifies the UE user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 7 | UE | | | The user accepts the location request before timer T(LCSN) expires |
| 8 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionGranted |
| 9 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 10 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 11 | UE | | | The UE notifies the UE user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 12 | UE | | | The user denies the location request before timer T(LCSN) expires |
| 13 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionDenied |
| 14 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationAllowedIfNoResponse |
| 15 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 16 | UE | | | The UE notifies the UE user of the location request and indicates to the user that location will be allowed in the absence of a response |
| 17 | UE | | | The user does not reply |
| 18 | SS | | | SS waits until T(LCSN) expires to ensure that the UE does not send a RELEASE COMPLETE message. |
| 19 | <- | | RELEASE COMPLETE | SS terminates the dialogue |
| 20 | SS | | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Steps 4, 9 and 14)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

RELEASE COMPLETE (Step 13)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionDenied |

RELEASE COMPLETE (Step 19)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |

#### 6.2.3.4.5 Test requirements

After steps 4, 9 and 14 the UE shall notify the UE user of the location request and indicate to the user that location will be allowed in the absence of a response.

After step 7 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionGranted.

After step 12 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionDenied.

During step 18 the UE shall not send any RELEASE COMPLETE message.

### 6.2.3.5 Privacy Verification - Location Not Allowed if No Response

#### 6.2.3.5.1 Definition

This test case applies to all UEs supporting UE-Based or UE-Assisted GANSS or GNSS Location Service capabilities and LCS value added location request notification capability.

#### 6.2.3.5.2 Conformance requirements

1) The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

2) In case of privacy verification the MS shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

3) If the timer expires in the network before any response from the MS (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in GSM 03.71 for GSM and TS 23.171 for UMTS (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

References

- Conformance requirement 1, 2 and 3: TS 24.030, clause 4.1.1

#### 6.2.3.5.3 Test Purpose

To verify that when the UE receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, the UE notifies the UE user of the location request and indicates that the default response is location not allowed if no response and providing the opportunity to accept or deny the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied or permissionGranted as appropriate.

#### 6.2.3.5.4 Method of Test

Initial Conditions

System Simulator (SS):

- 1 cell, default parameters

UE:

- State "CS-CELL DCH Initial (State 6-1)" as specified in clause 7.4.1 of TS 34.108.

Related PICS/PIXIT Statements

- UE Based Network Assisted GANSS.
- UE Assisted Network Assisted GANSS.
- UE supporting LCS value added location request notification capability.
- px_UeLcsNotification: value for UE LCS Notification timeout timer.

Test Procedure

The SS initiates authentication and ciphering and sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The UE notifies the UE user of the location request with the option to accept or deny the request and an indication that location will be not allowed if no user response is received.

The user accepts the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The UE notifies the UE user of the location request with the option to accept or deny the request and an indication that location will be not allowed if no user response is received.

The user denies the location request. The UE responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

The SS sends a REGISTER message containing a Facility IE containing a LCS Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse.

The UE notifies the UE user of the location request with the option to accept or deny the request and an indication that location will be not allowed if no user response is received.

The user ignores the location request by taking no action, allowing the verification process to time-out.

The SS send a RELEASE COMPLETE.

Expected Sequence

| Step | Direction | | Message | Comments |
|---|---|---|---|---|
| | UE | SS | | |
| 1 | <-- | | AUTHENTICATION REQUEST | |
| 2 | --> | | AUTHENTICATION RESPONSE | |
| 3 | SS | | | SS starts security procedure |
| 4 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 5 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 6 | UE | | | The UE notifies the UE user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 7 | UE | | | The user accepts the location request before timer T(LCSN) expires |
| 8 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionGranted |
| 9 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 10 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 11 | UE | | | The UE notifies the UE user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 12 | UE | | | The user denies the location request before timer T(LCSN) expires |
| 13 | -> | | RELEASE COMPLETE | Containing a LocationNotification return result with verificationResponse set to permissionDenied |
| 14 | <- | | REGISTER | Call Independent SS containing Facility IE Location Notification Invoke message set to notifyAndVerify-LocationNotAllowedIfNoResponse |
| 15 | SS | | | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification |
| 16 | UE | | | The UE notifies the UE user of the location request and indicates to the user that location will be not allowed in the absence of a response |
| 17 | UE | | | The user does not reply |
| 18 | SS | | | SS waits until T(LCSN) expires to verify that the UE does not send a RELEASE COMPLETE message. |
| 19 | <- | | RELEASE COMPLETE | SS terminates the dialogue |
| 20 | SS | | | SS releases the connection and the test case ends |

Specific Message Contents

REGISTER (Steps 4, 9 and 14)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | REGISTER (0011 1011) |
| Facility | Invoke = LCS-LocationNotification<br>LocationNotificationArg<br>notificationType -> notifyAndVerify-LocationNotAllowedIfNoResponse<br>locationType -> current Location<br>lcsClientExternalID -> externalAddress<br>lcsClientName ->dataCodingScheme<br>nameString |

RELEASE COMPLETE (Step 8)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionGranted |

RELEASE COMPLETE (Step 13)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (xx10 1010) |
| Facility | Return result = LCS-LocationNotification<br>LocationNotificationRes<br>verificationResponse -> permissionDenied |

RELEASE COMPLETE (Step 19)

| Information element | Value/remark |
|---|---|
| Protocol Discriminator | Call Independent SS message (1011) |
| Transaction identifier | |
| Message type | RELEASE COMPLETE (0010 1010) |

#### 6.2.3.5.5 Test requirements

After steps 4, 9 and 14 the UE shall notify the UE user of the location request and indicate to the user that location will be not allowed in the absence of a response.

After step 7 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionGranted.

After step 12 the UE shall send a RELEASE COMPLETE message with verificationResponse set to permissionDenied.

During step 18 the UE shall not send any RELEASE COMPLETE message.

# 7 Protocol Conformance Test Cases for E-UTRAN

## 7.1 NAS Protocol Procedures

### 7.1.1 UE Network Capability

#### 7.1.1.1 Test Purpose (TP)

(1)

```
with { the UE having received an RRCConnectionSetup message. }
ensure that {
  when {    the UE transmits ATTACH REQUEST }
    then {  the UE correctly sets UE Network Capability IE values for LCS and LPP }
            }
```

#### 7.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.171 clause 4.2.1 and TS 24.301 clause 9.9.3.3.

[TS 24.171, clause 4.2.1]

The UE announces to the network its ability to support LCS notification mechanism and/or LPP messages using the UE Network Capability IE defined in 3GPP TS 24.301.

[TS 24.301, clause 9.9.3.3]

The purpose of the UE network capability information element is to provide the network with information concerning aspects of the UE related to EPS or interworking with GPRS. The contents might affect the manner in which the network handles the operation of the UE. The UE network capability information indicates general UE characteristics and it shall therefore, except for fields explicitly indicated, be independent of the frequency band of the channel it is sent on.

…

#### 7.1.1.3 Test description

##### 7.1.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.

UE:

-

Preamble:

- the UE is in state Switched OFF (state 1) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

-

7.1.1.3.2 Test procedure sequence

**Table 7.1.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | | <-- | RRC: SYSTEM INFORMATION (BCCH) | - | - |
| 2 | UE transmits an *RRCConnectionRequest* message. | --> | RRC: *RRCConnectionRequest* | - | - |
| 3 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: *RRCConnectionSetup* | - | - |
| 4 | The UE transmits an *RRCConnectionSetupComplete* message to confirm the successful completion of the connection establishment and to initiate the Attach procedure by including the ATTACH REQUEST message. The PDN CONNECTIVITY REQUEST message is piggybacked in ATTACH REQUEST | --> | RRC: *RRCConnectionSetupComplete*<br>NAS: ATTACH REQUEST<br>NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 5 to 17 | Steps 5 to 17 of the registration procedure described in TS 36.508 subclause 4.5.2.3 are performed.<br>NOTE: The UE performs registration and the RRC connection is released. | | | | |

7.1.1.3.3 Specific message contents

**Table 7.1.1.3.3-1: ATTACH REQUEST (step 4, Table 7.1.1.3.2-1)**

| Derivation Path: 24.301 clause 8.2.4 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | EMM | | |
| Security header type | '0000'B | Plain NAS message, not security protected | |
| Attach request message identity | '0100 0001'B | Attach request | |
| EPS attach type | '0001'B | EPS attach | EPS_only |
| | '0010'B | combined EPS/IMSI attach | combined_EPS_IMSI |
| NAS key set identifier | Any allowed value | | |
| Old GUTI or IMSI | Any allowed value | | |
| UE network capability | Set according to Table 7.1.1.3.3-2 | | |
| ESM message container | PDN CONNECTIVITY REQUEST message to request PDN connectivity to the default PDN | | |
| Old P-TMSI signature | Not present or any allowed value | | |
| Additional GUTI | Not present or any allowed value | | |
| Last visited registered TAI | Not present or any allowed value | | |
| DRX parameter | Not present or any allowed value | | |
| MS network capability | Not present or any allowed value | | |
| Old location area identification | Not present or any allowed value | | |
| TMSI status | Not present or any allowed value | | |
| Mobile station classmark 2 | Not present or any allowed value | | |
| Mobile station classmark 3 | Not present or any allowed value | | |
| Supported Codecs | Not present or any allowed value | | |
| Additional update type | Not present | | EPS_only |
| Additional update type | Not present or any allowed value | | combined_EPS_IMSI |

| Condition | Explanation |
|---|---|
| EPS_only | See the definition below table 4.7.2-1 in TS 36.508. |
| combined_EPS_IMSI | See the definition below table 4.7.2-1 in TS 36.508. |

NOTE: This message is sent integrity protected when a valid security context exists and without integrity protection otherwise.

**Table 7.1.1.3.3-2: UE network capability (step 4, Table 7.1.1.3.2-1)**

| Derivation Path: 24.301 clause 9.9.3.34 | | | |
|---|---|---|---|
| **Information Element Contents** | **Value/remark** | **Comment** | **Condition** |
| Octet 7, bit 3 | Set according to pc_MT_LR_loc_notif | Location services (LCS) notification mechanisms capability | |
| Octet 7, bit 4 | 1 (LPP supported) | LTE Positioning Protocol (LPP) capability | |
| All other octets/bits | Any allowed value | | |

# 7.2 LCS Procedures

## 7.2.1 Location Notification and Privacy Verification

### 7.2.1.1 Location Notification

#### 7.2.1.1.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection existing }
ensure that {
  when {    UE receives a REGISTER message containing the LCS-LocationNotification Invoke component
            set to NotifyLocationAllowed }
    then {  UE notifies the user of the location procedure and terminates the dialogue by sending a
            RELEASE COMPLETE message }
            }
```

#### 7.2.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.171, clause 5.2.1.1.1.

[TS 24.171, clause 5.2.1.1.1]

The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

…

In the case of location notification no response is required from the UE, the UE shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

…

#### 7.2.1.1.3 Test description

##### 7.2.1.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

- UE supporting LCS value added location request notification capability.

7.2.1.1.3.2 Test procedure sequence

**Table 7.2.1.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 2 | The UE notifies the user of the location procedure | | | 1 | P |
| 3 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 1 | P |

7.2.1.1.3.3 Specific message contents

**Table 7.2.1.1.3.3-1: *DLInformationTransfer* (step 1, Table 7.2.1.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.1.1.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.1.1.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (step 1, Table 7.2.1.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | Set according to Table 7.2.1.1.3.3-3 | REGISTER | |
| Additional information | Not present. | | |

**Table 7.2.1.1.3.3-3: REGISTER (step 1, Table 7.2.1.1.3.2-1)**

| Derivation Path: 24.080 Table 2.3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Register message type | xx11 1011 | REGISTER | |
| Facility | Invoke = lcs-LocationNotification | Set according to Table 7.2.1.1.3.3-4 | |

**Table 7.2.1.1.3.3-4: LCS-LocationNotification (step 1, Table 7.2.1.1.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationArg ::= SEQUENCE { | | | |
| notificationType | notifyLocationAllowed | | |
| locationType | currentLocation | | |
| lcsClientExternalID SEQUENCE { | | | |
| externalAddress | ISDN-AddressString | | |
| } | | | |
| lcsClientName SEQUENCE { | | | |
| dataCodingScheme | USSD-DataCodingScheme | | |
| nameString | NameString | | |
| } | | | |
| } | | | |

**Table 7.2.1.1.3.3-5: *ULInformationTransfer* (step 3, Table 7.2.1.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.1.1.3.3-6 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.1.1.3.3-6: UPLINK GENERIC NAS TRANSPORT (step 3, Table 7.2.1.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | Set according to Table 7.2.1.1.3.3-7 | RELEASE COMPLETE | |
| Additional information | Not present | | |

**Table 7.2.1.1.3.3-7: RELEASE COMPLETE (step 3, Table 7.2.1.1.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |
| Facility | Return result = LocationNotificationRes | Set according to Table 7.2.1.1.3.3-8 | |

**Table 7.2.1.1.3.3-8: LocationNotificationRes (step 3, Table 7.2.1.1.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationRes ::= SEQUENCE { | | | |
| verificationResponse | permissionGranted | | |
| } | | | |

## 7.2.1.2 Privacy Verification – Location Allowed if no Response

### 7.2.1.2.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection existing }
ensure that {
  when {    UE receives a REGISTER message containing the LCS-LocationNotification Invoke component
            set to NotifyAndVerify-LocationAllowedIfNoResponse }
    then {  UE notifies the user of the location procedure and indicates that the default response
            is location allowed, allows the user to accept or deny the request and terminates the
            dialogue by sending a RELEASE COMPLETE message with verificationResponse set as
            appropriate }
            }
```

(2)

```
with { a NAS signalling connection existing }
ensure that {
  when {    UE receives a REGISTER message containing the LCS-LocationNotification Invoke component
            set to NotifyAndVerify-LocationAllowedIfNoResponse }
    then {  UE notifies the user of the location procedure and indicates that the default response
            is location allowed, allows the user to accept or deny the request and waits for the
            user to respond }
            }
```

#### 7.2.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.171, clause 5.2.1.1.1.

[TS 24.171, clause 5.2.1.1.1]

The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

In case of privacy verification the UE shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

If the timer T(LCSN) expires in the network before any response from the UE (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in 3GPP TS 23.271 (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

…

#### 7.2.1.2.3 Test description

##### 7.2.1.2.3.1 Pre-test conditions

System Simulator:

- Cell 1.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

- UE supporting LCS value added location request notification capability.
- px_UeLcsNotification: value for UE LCS Notification timeout timer.

7.2.1.2.3.2 Test procedure sequence

**Table 7.2.1.2.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 2 | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification | | | - | - |
| 3 | The UE notifies the user of the location procedure and indicates that location will be allowed in the absence of a response | | | 1 | P |
| 4 | The user accepts the location request before timer T(LCSN) expires | | | - | - |
| 5 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 1 | P |
| 6 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 7 | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification | | | - | - |
| 8 | The UE notifies the user of the location procedure and indicates that location will be allowed in the absence of a response | | | 1 | P |
| 9 | The user denies the location request before timer T(LCSN) expires | | | - | - |
| 10 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 1 | P |
| 11 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 12 | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification | | | - | - |
| 13 | The UE notifies the user of the location procedure and indicates that location will be allowed in the absence of a response | | | 2 | P |
| 14 | The user does not reply | | | - | - |
| 15 | SS waits until T(LCSN) expires to ensure that the UE does not send a RELEASE COMPLETE message. | | | 2 | P |
| 16 | The SS terminates the dialogue by sending a RELEASE COMPLETE message. | <-- | *DLInformationTransfer* (RELEASE COMPLETE) | - | - |

7.2.1.2.3.3 Specific message contents

**Table 7.2.1.2.3.3-1: *DLInformationTransfer* (steps 1, 6, 11 and 16, Table 7.2.1.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.1.2.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.1.2.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1, 6, 11 and 16, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | **Step 1, 6, 11:** Set according to Table 7.2.1.2.3.3-3 | REGISTER | |
| | **Step 16:** Set according to Table 7.2.1.2.3.3-11 | RELEASE COMPLETE | |
| Additional information | Not present. | | |

**Table 7.2.1.2.3.3-3: REGISTER (steps 1, 6, and 11, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 Table 2.3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Register message type | xx11 1011 | REGISTER | |
| Facility | Invoke = lcs-LocationNotification | Set according to Table 7.2.1.2.3.3-4 | |

**Table 7.2.1.2.3.3-4: LCS-LocationNotification (step 1, 6 and 11, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationArg ::= SEQUENCE { | | | |
| notificationType | notifyAndVerify-LocationAllowedIfNoResponse | | |
| locationType | currentLocation | | |
| lcsClientExternalID SEQUENCE { | | | |
| externalAddress | ISDN-AddressString | | |
| } | | | |
| lcsClientName SEQUENCE { | | | |
| dataCodingScheme | USSD-DataCodingScheme | | |
| nameString | NameString | | |
| } | | | |
| } | | | |

**Table 7.2.1.2.3.3-5: *ULInformationTransfer* (steps 5 and 10, Table 7.2.1.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.1.2.3.3-6 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.1.2.3.3-6: UPLINK GENERIC NAS TRANSPORT (steps 5 and 10, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | **Step 5:** Set according to Table 7.2.1.2.3.3-7 | RELEASE COMPLETE | |
| | **Step 10:** Set according to Table 7.2.1.2.3.3-9 | RELEASE COMPLETE | |
| Additional information | Not present | | |

**Table 7.2.1.2.3.3-7: RELEASE COMPLETE (step 5, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |
| Facility | Return result = LocationNotificationRes | Set according to Table 7.2.1.2.3.3-8 | |

**Table 7.2.1.2.3.3-8: LocationNotificationRes (step 5, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationRes ::= SEQUENCE { | | | |
| verificationResponse | permissionGranted | | |
| } | | | |

**Table 7.2.1.2.3.3-9: RELEASE COMPLETE (step 10, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |
| Facility | Return result = LocationNotificationRes | Set according to Table 7.2.1.2.3.3-10 | |

**Table 7.2.1.2.3.3-10: LocationNotificationRes (step 10, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationRes ::= SEQUENCE { | | | |
| verificationResponse | permissionDenied | | |
| } | | | |

**Table 7.2.1.2.3.3-11: RELEASE COMPLETE (step 16, Table 7.2.1.2.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |

### 7.2.1.3 Privacy Verification – Location not Allowed if No Response

#### 7.2.1.3.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection existing }
ensure that {
  when {    UE receives a REGISTER message containing the LCS-LocationNotification Invoke component
            set to NotifyAndVerify-LocationNotAllowedIfNoResponse }
    then {  UE notifies the user of the location procedure and indicates that the default response
            is location not allowed, allows the user to accept or deny the request and terminates
            the dialogue by sending a RELEASE COMPLETE message with verificationResponse set as
            appropriate }
            }
```

(2)

```
with { a NAS signalling connection existing }
ensure that {
  when {    UE receives a REGISTER message containing the LCS-LocationNotification Invoke component
            set to NotifyAndVerify-LocationNotAllowedIfNoResponse }
    then {  UE notifies the user of the location procedure and indicates that the default response
            is location not allowed, allows the user to accept or deny the request and waits for the
            user to respond }
            }
```

#### 7.2.1.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.171, clause 5.2.1.1.1.

[TS 24.171, clause 5.2.1.1.1]

The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the UE. This may be sent either to request verification for MT-LR or to notify about already authorized MT-LR.

In case of privacy verification the UE shall respond to the request by sending a RELEASE COMPLETE message containing the mobile subscriber's response in a return result component.

If the timer T(LCSN) expires in the network before any response from the UE (e.g. due to no response from the user), the network shall interpret this by applying the default treatment defined in 3GPP TS 23.271 (i.e. disallow location if barred by subscription and allow location if allowed by subscription).

…

#### 7.2.1.3.3 Test description

##### 7.2.1.3.3.1 Pre-test conditions

System Simulator:

- Cell 1.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

- UE supporting LCS value added location request notification capability.

- px_UeLcsNotification: value for UE LCS Notification timeout timer.

7.2.1.3.3.2 Test procedure sequence

**Table 7.2.1.3.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 2 | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification | | | - | - |
| 3 | The UE notifies the user of the location procedure and indicates that location will be not allowed in the absence of a response | | | 1 | P |
| 4 | The user accepts the location request before timer T(LCSN) expires | | | - | - |
| 5 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 1 | P |
| 6 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 7 | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification | | | - | - |
| 8 | The UE notifies the user of the location procedure and indicates that location will be not allowed in the absence of a response | | | 1 | P |
| 9 | The user denies the location request before timer T(LCSN) expires | | | - | - |
| 10 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 1 | P |
| 11 | The SS sends a REGISTER message containing a LCS-LocationNotification Invoke component. | <-- | *DLInformationTransfer* (REGISTER) | - | - |
| 12 | SS starts timer T(LCSN) set to 90% of px_UeLcsNotification | | | - | - |
| 13 | The UE notifies the user of the location procedure and indicates that location will be not allowed in the absence of a response | | | 2 | P |
| 14 | The user does not reply | | | - | - |
| 15 | SS waits until T(LCSN) expires to ensure that the UE does not send a RELEASE COMPLETE message. | | | 2 | P |
| 16 | The SS terminates the dialogue by sending a RELEASE COMPLETE message. | <-- | *DLInformationTransfer* (RELEASE COMPLETE) | - | - |

7.2.1.3.3.3 Specific message contents

**Table 7.2.1.3.3.3-1: *DLInformationTransfer* (steps 1, 6, 11 and 16, Table 7.2.1.3.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.1.3.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.1.3.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1, 6, 11 and 16, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | **Step 1, 6, 11:** Set according to Table 7.2.1.3.3.3-3 | REGISTER | |
| | **Step 16:** Set according to Table 7.2.1.3.3.3-11 | RELEASE COMPLETE | |
| Additional information | Not present. | | |

**Table 7.2.1.3.3.3-3: REGISTER (steps 1, 6, and 11, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 Table 2.3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Register message type | xx11 1011 | REGISTER | |
| Facility | Invoke = lcs-LocationNotification | Set according to Table 7.2.1.3.3.3-4 | |

**Table 7.2.1.3.3.3-4: LCS-LocationNotification (step 1, 6 and 11, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationArg ::= SEQUENCE { | | | |
| notificationType | notifyAndVerify-LocationNotAllowedIfNoResponse | | |
| locationType | currentLocation | | |
| lcsClientExternalID SEQUENCE { | | | |
| externalAddress | ISDN-AddressString | | |
| } | | | |
| lcsClientName SEQUENCE { | | | |
| dataCodingScheme | USSD-DataCodingScheme | | |
| nameString | NameString | | |
| } | | | |
| } | | | |

**Table 7.2.1.3.3.3-5: *ULInformationTransfer* (steps 5 and 10, Table 7.2.1.3.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.1.3.3.3-6 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.1.3.3.3-6: UPLINK GENERIC NAS TRANSPORT (steps 5 and 10, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | **Step 5:** Set according to Table 7.2.1.3.3.3-7 | RELEASE COMPLETE | |
| | **Step 10:** Set according to Table 7.2.1.3.3.3-9 | RELEASE COMPLETE | |
| Additional information | Not present | | |

**Table 7.2.1.3.3.3-7: RELEASE COMPLETE (step 5, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |
| Facility | Return result = LocationNotificationRes | Set according to Table 7.2.1.3.3.3-8 | |

**Table 7.2.1.3.3.3-8: LocationNotificationRes (step 5, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationRes ::= SEQUENCE { | | | |
| verificationResponse | permissionGranted | | |
| } | | | |

**Table 7.2.1.3.3.3-9: RELEASE COMPLETE (step 10, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |
| Facility | Return result = LocationNotificationRes | Set according to Table 7.2.1.3.3.3-10 | |

**Table 7.2.1.3.3.3-10: LocationNotificationRes (step 10, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LocationNotificationRes ::= SEQUENCE { | | | |
| verificationResponse | permissionDenied | | |
| } | | | |

**Table 7.2.1.3.3.3-11: RELEASE COMPLETE (step 16, Table 7.2.1.3.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |

## 7.2.2 EPC-MO-LR

### 7.2.2.1 Autonomous Self Location: UE-based

#### 7.2.2.1.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection existing }
ensure that {
  when { an EPC-MO-LR location session is initiated at the UE of type "assistanceData"  }
    then { UE sends a REGISTER message containing a LCS-MOLR invoke component }
            }
```

(2)

```
with { UE having performed the last location request operation }
ensure that {
  when { UE has received a FACILITY message containing the LCS-MOLR return result component }
    then { UE terminates the dialogue by sending a RELEASE COMPLETE message }
            }
```

#### 7.2.2.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.171, clause 5.2.2.1.

[TS 24.171, clause 5.2.2.1.1]

The UE invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

...

The network shall pass the result of the location procedure to the UE by sending a FACILITY message to the UE containing a LCS-MOLR return result component.

…

After the last location request operation the UE shall terminate the dialogue by sending a RELEASE COMPLETE message.

…

#### 7.2.2.1.3 Test description

##### 7.2.2.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: As specified in 5.2.1.

UE:

- The UE shall begin the test with no assistance data stored.

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

- Method of clearing stored assistance data.

- Method of triggering an EPC-MO-LR request for assistance data.

7.2.2.1.3.2 Test procedure sequence

**This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:**

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |

**Table 7.2.2.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The UE sends a NAS PDU containing an MO-LR Request of type "assistanceData" inside an RRC UL Information Transfer message. The embedded LPP message specifies the type of assistance data. | --> | *ULInformationTransfer* (REGISTER) | 1 | P |
| 2 | The SS provides the requested assistance data in an LPP message of type "Assistance Data". | <-- | *DLInformationTransfer* (LPP PROVIDE ASSISTANCE DATA) | - | - |
| 3 | The SS sends a FACILITY message containing a LCS-MOLR return result component. | <-- | *DLInformationTransfer* (FACILITY) | - | - |
| 4 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 2 | P |

7.2.2.1.3.3 Specific message contents

**Table 7.2.2.1.3.3-1: *ULInformationTransfer* (steps 1 and 4, Table 7.2.2.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.2.1.3.3-2 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.1.3.3-2: UPLINK GENERIC NAS TRANSPORT (steps 1 and 4, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000010 | Location services message container | |
| Generic message container | **Step 1:** Set according to Table 7.2.2.1.3.3-3 | REGISTER | |
| | **Step 4:** Set according to Table 7.2.2.1.3.3-11 | RELEASE COMPLETE | |
| Additional information | Not present | | |

**Table 7.2.2.1.3.3-3: REGISTER (step 1, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.080 Table 2.4 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Register message type | xx11 1011 | REGISTER | |
| Facility | Invoke=LCS-MOLR | Set according to Table 7.2.2.1.3.3-4 | |
| SS version | Version 1 or above | | |

**Table 7.2.2.1.3.3-4: LCS-MOLRArg (step 1, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LCS-MOLRArg ::= SEQUENCE { | | | |
| molr-Type | assistanceData | | |
| multiplePositioningProtocolPDUs SEQUENCE (SIZE (1..3)) OF OCTET STRING | At least one LPP message of type Request Assistance Data (UE may include additional LPP messages) | Set according to Table 7.2.2.1.3.3-5 | |
| } | | | |

**Table 7.2.2.1.3.3-5: LPP Request Assistance Data (step 1, Table 7.2.2.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | targetDevice | | |
| transactionNumber | (0..255) | | |
| } | | | |
| endTransaction | FALSE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement | Not present | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| requestAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| requestAssistanceData-r9 SEQUENCE { | | | |
| commonIEsRequestAssistanceData | | | |
| a-gnss-RequestAssistanceData | Present. | | |
| otdoa-RequestAssistanceData | | | |
| epdu-RequestAssistanceData | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.1.3.3-6: *DLInformationTransfer* (steps 2 and 3, Table 7.2.2.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.2.1.3.3-7 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.1.3.3-7: DOWNLINK GENERIC NAS TRANSPORT (steps 2 and 3, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | **Step 2:** 00000001 | LTE Positioning Protocol (LPP) message container | |
| | **Step 3:** 00000010 | Location services message container | |
| Generic message container | **Step 2:** Set according to Table 7.2.2.1.3.3-8 | LPP Provide Assistance Data | |
| | **Step 3:** Set according to Table 7.2.2.1.3.3-9 | FACILITY | |
| Additional information | **Step 2:** present | Routing Identifier/ Correlation ID | |
| | **Step 3:** Not present. | | |

**Table 7.2.2.1.3.3-8: LPP Provide Assistance Data (step 2, Table 7.2.2.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | targetDevice | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Assistance Data message in step 1 Table 7.2.2.1.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement | Not present | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData-r9 SEQUENCE { | | | |
| a-gnss-ProvideAssistanceData | The SS provides the assistance data requested by the UE at step 1, Table 7.2.2.1.3.2-1 which are available according to TS 37.571-5 [12]. | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.1.3.3-9: FACILITY (step 3, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.080 Table 2.3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Facility message type | xx11 1010 | FACILITY | |
| Facility | Return Result=LCS-MOLRRes | Set according to Table 7.2.2.1.3.3-10 | |

**Table 7.2.2.1.3.3-10: LCS-MOLRRes (step 3, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LCS-MOLRRes::= SEQUENCE { | empty | | |
| } | | | |

**Table 7.2.2.1.3.3-11: RELEASE COMPLETE (step 4, Table 7.2.2.1.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |

## 7.2.2.2 Basic Self Location: UE-assisted

### 7.2.2.2.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection existing }
ensure that {
  when { an EPC-MO-LR location session is initiated at the UE of type "locationEstimate"  }
    then { UE sends a REGISTER message containing a LCS-MOLR invoke component }
           }
```

(2)

```
with { UE having performed the last location request operation }
ensure that {
  when { UE has received a FACILITY message containing the LCS-MOLR return result component }
    then { UE terminates the dialogue by sending a RELEASE COMPLETE message }
           }
```

### 7.2.2.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.171, clause 5.2.2.1.

[TS 24.171, clause 5.2.2.1.1]

The UE invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

...

The network shall pass the result of the location procedure to the UE by sending a FACILITY message to the UE containing a LCS-MOLR return result component.

…

After the last location request operation the UE shall terminate the dialogue by sending a RELEASE COMPLETE message.

…

#### 7.2.2.2.3 Test description

##### 7.2.2.2.3.1 Pre-test conditions

System Simulator:

- Subtests 1-4: Cell 1.
- Subtest 5: Cell 1, Cell 2, Cell 4 as specified in 5.2.2.
- Subtest 6: Cell 1, Cell 2, Cell 4 as specified in 5.2.3.
- Satellite signals (Subtests 1-4): As specified in 5.2.1.

UE:

- The UE shall begin the test with no assistance data stored.

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

- Method of clearing stored assistance data.
- Method of triggering an EPC-MO-LR request for a location estimate.

##### 7.2.2.2.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the positioning method supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |
| 5 | UE supporting OTDOA |
| 6 | UE supporting ECID |

**Table 7.2.2.2.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The UE sends a NAS PDU containing an MO-LR Request of type "locationEstimate" inside an RRC UL Information Transfer message. The MO-LR message may optionally include up to three LPP positioning messages. | --> | *ULInformationTransfer* (REGISTER) | 1 | P |
| 2a | IF the UE does not include a LPP Provide Capabilities message in step 1 THEN the SS sends a LPP message of type Request Capabilities. | <-- | *DLInformationTransfer* (LPP REQUEST CAPABILITIES) | - | - |
| 2b | IF the SS perfomed step 2a THEN the UE sends a LPP message of type Provide Capabilities including the UE positioning capabilities. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | - | - |
| 2c | IF the UE LPP message at step 2b includes an acknowledgment request THEN SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |
| 2d | IF the UE included a LPP message of type Request Assistance Data in step 1 THEN SS sends a LPP message of type Provide Assistance Data including an error indication without assistance data. | <-- | *DLInformationTransfer* (LPP PROVIDE ASSISTANCE DATA) | - | - |
| 3 | IF NOT sub-test-6 THEN The SS sends a LPP message of type Provide Assistance Data including the assistance data as defined in subclause 5.4.1, dependent on UE capabilities and sub-test. | <-- | *DLInformationTransfer* (LPP PROVIDE ASSISTANCE DATA) | - | - |
| 4 | The SS sends a LPP message of type Request Location Information. | <-- | *DLInformationTransfer* (LPP REQUEST LOCATION INFORMATION) | - | - |
| 5 | The UE sends a LPP message of type Provide Location Information including measurements as requested at step 4. | --> | *ULInformationTransfer* (LPP PROVIDE LOCATION INFORMATION) | - | - |
| 5a | IF the UE LPP message at step 5 includes an acknowledgement request THEN the SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |
| 6 | The SS sends a FACILITY message containing a LCS-MOLR return result component. | <-- | *DLInformationTransfer* (FACILITY) | - | - |
| 7 | The UE terminates the dialogue by sending a RELEASE COMPLETE message. | --> | *ULInformationTransfer* (RELEASE COMPLETE) | 2 | P |

7.2.2.2.3.3 Specific message contents

**Table 7.2.2.2.3.3-1: *ULInformationTransfer* (steps 1, 2b, 5 and 7, Table 7.2.2.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.2.2.3.3-2 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.2.3.3-2: UPLINK GENERIC NAS TRANSPORT (steps 1, 2b, 5 and 7, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | **Steps 1 and 7:** 00000010 | Location services message container | |
| | **Step 2b, and 5:** 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 1:** Set according to Table 7.2.2.2.3.3-3 | REGISTER | |
| | **Step 2b:** Set according to Table 7.2.2.2.3.3-8 | LPP Provide Capabilities | |
| | **Step 5:** Set according to Table 7.2.2.2.3.3-13 | LPP Provide Location Information | |
| | **Step 7:** Set according to Table 7.2.2.2.3.3-16 | RELEASE COMPLETE | |
| Additional information | **Steps 1 and 7:** Not present | | |
| | **Step 2b:** present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 2a Table 7.2.2.2.3.2-1) | |
| | **Step 5:** | The UE includes the Routing Identifier received in the Additional | |

| | | | |
|---|---|---|---|
| | | Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 4 Table 7.2.2.2.3.2-1) | |

**Table 7.2.2.2.3.3-3: REGISTER (step 1, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.080 Table 2.4 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Register message type | xx11 1011 | REGISTER | |
| Facility | Invoke=LCS-MOLR | Set according to Table 7.2.2.2.3.3-4 | |
| SS version | Version 1 or above | | |

**Table 7.2.2.2.3.3-4: LCS-MOLRArg (step 1, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LCS-MOLRArg ::= SEQUENCE { | | | |
| molr-Type | locationEstimate | | |
| multiplePositioningProtocolPDUs SEQUENCE (SIZE (1..3)) OF OCTET STRING | May include up to three LPP messages | | |
| } | | | |

**Table 7.2.2.2.3.3-5: *DLInformationTransfer* (steps 2a, 2c, 2d, 3, 4, 5a and 6, Table 7.2.2.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.2.2.2.3.3-6 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.2.3.3-6: DOWNLINK GENERIC NAS TRANSPORT (steps 2a, 2c, 2d, 3, 4, 5a and 6, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | **Step 2a, 2c, 2d, 3, 4, 5a:** 00000001 | LTE Positioning Protocol (LPP) message container | |
| | **Step 6:** 00000010 | Location services message container | |
| Generic message container | **Step 2a:** Set according to Table 7.2.2.2.3.3-7 | LPP Request Capabilities | |
| | **Step 2c, 5a:** Set according to Table 7.2.2.2.3.3-9 | LPP Acknowledgement | |
| | **Step 2d:** Set according to Table 7.2.2.2.3.3-10 | LPP Provide Assistance Data | |
| | **Step 3:** Set according to Table 7.2.2.2.3.3-11 | LPP Provide Assistance Data | |
| | **Step 4:** Set according to Table 7.2.2.2.3.3-12 | LPP Request Location Information | |
| | **Step 6:** Set according to Table 7.2.2.2.3.3-14 | FACILITY | |
| Additional information | **Steps 2a, 2c, 2d, 3, 4, 5a:** Present | Routing Identifier/ Correlation ID | |
| | **Step 6:** Not present. | | |

**Table 7.2.2.2.3.3-7: LPP Request Capabilities (step 2a, Table 7.2.2.2.3.2-1)**

| Derivation Path: Table 5.4-1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-1 | | | |

**Table 7.2.2.2.3.3-8: LPP Provide Capabilities (step 2b, Table 7.2.2.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Capabilities message in step 2a Table 7.2.2.2.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | Contains a different value compared to any other UL message already sent by the UE. | |
| acknowledgement SEQUENCE { | Present, or not present. | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities-r9 SEQUENCE { | | | |
| commonIEsProvideCapabilities | Not present | | |
| a-gnss-ProvideCapabilities SEQUENCE{ | | | |
| gnss-SupportList | Present for sub-tests 1-4 | | |
| assistanceDataSupportList | Present for sub-tests 1-4 | | |
| locationCoordinateTypes | Present for sub-tests 1-4 | | |
| velocityTypes | Present for sub-tests 1-4 | | |
| } | | | |
| otdoa-ProvideCapabilities | Present for sub-test 5 | | |
| ecid-ProvideCapabilities | Present for sub-test 6 | | |
| epdu-ProvideCapabilities | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.2.3.3-9: LPP Acknowledgement (steps 2c and 5a, Table 7.2.2.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | **Step 2c:**<br>(0..255) | Contains the same value of the sequenceNumber field as received by the SS in the LPP Provide Capabilities message in step 2b, Table 7.2.2.2.3.2-1. | |
| | **Step 5a:**<br>(0..255) | Contains the same value of the sequenceNumber field as received by the SS in the LPP Provide Location Information message in step 5, Table 7.2.2.2.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

**Table 7.2.2.2.3.3-10: LPP Provide Assistance Data (step 2d, Table 7.2.2.2.3.2-1)**

| Derivation Path: Table 4.4-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | Contains the same value as any potential LPP Request Assistance Data message included by the UE at step 1, Table 7.2.2.2.3.2-1. | |
| Initiator | targetDevice | | |
| transactionNumber | (0..255) | | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement | Not present. | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData-r9 SEQUENCE { | | | |
| commonIEsProvideAssistanceData | Not present | | |
| a-gnss-ProvideAssistanceData SEQUENCE { | Present, if UE requested GNSS assistance data at step 1, Table 7.2.2.2.3.2-1. | | |
| gnss-CommonAssistData | Not present | | |
| gnss-GenericAssistData | Not present | | |
| gnss-Error CHOICE { | | | |
| locationServerErrorCauses SEQUENCE { | | | |
| cause | undefined | | |
| } | | | |
| } | | | |
| } | | | |
| otdoa-ProvideAssistanceData SEQUENCE { | Present, if UE requested OTDOA assistance data at step 1, Table 7.2.2.2.3.2-1. | | |
| otdoa-ReferenceCellInfo | Not present | | |
| otdoa-NeighbourCellInfo | Not present | | |
| otdoa-Error CHOICE { | | | |
| locationServerErrorCauses SEQUENCE { | | | |
| cause | undefined | | |
| } | | | |
| } | | | |
| } | | | |
| epdu-ProvideAssistanceData | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.2.3.3-11: LPP Provide Assistance Data (step 3, Table 7.2.2.2.3.2-1)**

| Derivation Path: Table 5.4-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-2 with the following exceptions: | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | | |
| } | | | |

**Table 7.2.2.2.3.3-12: LPP Request Location Information (step 4, Table 7.2.2.2.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| locationInformationType | locationMeasurementsRequired | | |

**Table 7.2.2.2.3.3-13: LPP ProvideLocation Information (step 5, Table 7.2.2.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Location Information message in step 4 Table 7.2.2.2.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | Contains a different value compared to any other UL message already sent by the UE. | |
| acknowledgement SEQUENCE { | Present, or not present. | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation-r9 SEQUENCE { | | | |
| commonIEsProvideLocationInformation | Not present. | | |
| a-gnss-ProvideLocationInformation | Present for sub-tests 1-4. Any value acceptable | | |
| otdoa-ProvideLocationInformation | Present for sub-test 5. Any value acceptable | | |
| ecid-ProvideLocationInformation | Present for sub-test 6. Any value acceptable | | |
| epdu-ProvideLocationInformation | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.2.2.2.3.3-14: FACILITY (step 6, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.080 Table 2.3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Facility message type | xx11 1010 | FACILITY | |
| Facility | Return Result=LCS-MOLRRes | Set according to Table 7.2.2.2.3.3-15 | |

**Table 7.2.2.2.3.3-15: LCS-MOLRRes (step 6, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.080 clause 4.4.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LCS-MOLRRes::= SEQUENCE { | | | |
| locationEstimate | Any value. The SS shall not be required to calculate the value from the returned measurements. | | |
| } | | | |

**Table 7.2.2.2.3.3-16: RELEASE COMPLETE (step 7, Table 7.2.2.2.3.2-1)**

| Derivation Path: 24.080 Table 2.5 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Supplementary service protocol discriminator | 1011 | supplementary services (call independent) | |
| Transaction identifier | | | |
| Release Complete message type | xx10 1010 | RELEASE COMPLETE | |

# 7.3 LPP Procedures

## 7.3.1 LPP Common Procedures

### 7.3.1.1 Position Capability Transfer

#### 7.3.1.1.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when {    UE receives a LPP message of type REQUEST CAPABILITIES }
    then {  UE sends a LPP message of type PROVIDE CAPABILITIES with the correct supported
            capabilities }
            }
```

#### 7.3.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 5.1.

[TS 36.355, clause 5.1.3]

Upon receiving a *RequestCapabilities* message, the target device shall generate a *ProvideCapabilities* message as a response.

The target device shall:

1> for each positioning method for which a request for capabilities is included in the message:

2> if the target device supports this positioning method:

3> include the capabilities of the device for that supported positioning method in the response message;

1> set the IE *LPP-TransactionID* in the response message to the same value as the IE *LPP-TransactionID* in the received message;

…

[TS 36.355, clause 5.1.4]

When triggered to transmit a *ProvideCapabilities* message, the target device shall:

1> for each positioning method whose capabilities are to be indicated:

2> set the corresponding IE to include the device's capabilities;

2> if OTDOA capabilities are to be indicated:

3> include the IE *supportedBandListEUTRA*;

…

7.3.1.1.3 Test description

7.3.1.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

-

7.3.1.1.3.2 Test procedure sequence

**Table 7.3.1.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a LPP message of type Request Capabilities. | <-- | *DLInformationTransfer* (LPP REQUEST CAPABILITIES) | - | - |
| 2 | The UE sends a LPP message of type Provide Capabilities including the UE positioning capabilities. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | 1 | P |
| 2a | IF the UE LPP message at step 2 includes an acknowledgment request THEN SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |

7.3.1.1.3.3 Specific message contents

**Table 7.3.1.1.3.3-1: *DLInformationTransfer* (steps 1 and 2a, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.1.1.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.1.1.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1 and 2a, Table 7.3.1.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 1:** Set according to Table 7.3.1.1.3.3-3 | LPP Request Capabilities | |
| | **Step 2a:** Set according to Table 7.3.1.1.3.3-14 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/Correlation ID | |

**Table 7.3.1.1.3.3-3: LPP Request Capabilities (step 1, Table 7.3.1.1.3.2-1)**

| Derivation Path: Table 5.4-1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-1 with the following exception: | | | |
| epdu-RequestCapabilities SEQUENCE (SIZE (1)) OF SEQUENCE{ | | | |
| ePDU-Identifier SEQUENCE { | | | |
| ePDU-ID | 1 | OMA LPPe | |
| ePDU-Name | Not present | | |
| } | | | |
| ePDU-Body | Set according to Table 7.3.1.1.3.3-15 | | |
| } | | | |

**Table 7.3.1.1.3.3-4: *ULInformationTransfer* (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.1.1.3.3-5 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.1.1.3.3-5: UPLINK GENERIC NAS TRANSPORT (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.1.1.3.3-6 | LPP Provide Capabilities | |
| Addional information | Present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 1 Table 7.3.1.1.3.2-1) | |

**Table 7.3.1.1.3.3-6: LPP Provide Capabilities (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Capabilities message in step 1, Table 7.3.1.1.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | Present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities-r9 SEQUENCE { | | | |
| commonIEsProvideCapabilities | Not present | | |
| a-gnss-ProvideCapabilities SEQUENCE { | Present or not present dependent on (pc_UEB_AGNSS OR pc_UEA_AGNSS) | | |
| gnss-SupportList | Set according to Table 7.3.1.1.3.3-7 | | |
| assistanceDataSupportList | Set according to Table 7.3.1.1.3.3-8 | | |
| locationCoordinateTypes | Present or not present dependent on pc_UEB_AGNSS. Set according to Table 7.3.1.1.3.3-9 | | |
| velocityTypes | Present or not present dependent on pc_UEB_AGNSS. Set according to Table 7.3.1.1.3.3-10 | | |
| } | | | |
| otdoa-ProvideCapabilities | Present or not present dependent on pc_OTDOA. Set according to Table 7.3.1.1.3.3-11 | | |
| ecid-ProvideCapabilities | Present or not present dependent on pc_ECID. Set according to Table 7.3.1.1.3.3-12 | | |
| epdu-ProvideCapabilities | Present or not present dependent on UE capabilities. Set according to Table 7.3.1.1.3.3-13 | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

| | | | |
|---|---|---|---|
| } | | | |

**Table 7.3.1.1.3.3-7: gnss-SupportList (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.5.2.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| gnss-SupportList SEQUENCE (SIZE(1..n)) OF SEQUENCE{ | | Size n of SEQUENCE is dependent on UE capabilities | |
| gnss-ID | Dependent on UE capabilities | | |
| sbas-IDs | Dependent on UE capabilities | Present only if gnss-ID = sbas | |
| agnss-Modes | Dependent on UE capabilities | | |
| gnss-Signals | Dependent on UE capabilities | | |
| fta-MeasSupport SEQUENCE { | Present or not present dependent on pc_GNSS_FTA | | |
| cellTime | Dependent on UE capabilities | | |
| mode | Dependent on UE capabilities | | |
| } | | | |
| adr-Support | Dependent on UE capabilities | | |
| velocityMeasurementSupport | Dependent on UE capabilities | | |
| } | | | |

**Table 7.3.1.1.3.3-8: assistanceDataSupportList (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.5.2.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| assistanceDataSupportList SEQUENCE{ | | | |
| gnss-CommonAssistanceDataSupport SEQUENCE{ | | | |
| gnss-ReferenceTimeSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-ReferenceLocationSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-IonosphericModelSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-EarthOrientationParametersSupport | Present or not present and value dependent on UE capabilities. | | |
| } | | | |
| gnss-GenericAssistanceDataSupport SEQUENCE (SIZE (1..n)) OF SEQUENCE{ | | Size n of SEQUENCE is dependent on UE capabilities | |
| gnss-ID | Dependent on UE capabilities | | |
| sbas-ID | Dependent on UE capabilities | Present only if gnss-ID = sbas | |
| gnss-TimeModelsSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-DifferentialCorrectionsSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-NavigationModelSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-RealTimeIntegritySupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-DataBitAssistanceSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-AcquisitionAssistanceSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-AlmanacSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-UTC-ModelSupport | Present or not present and value dependent on UE capabilities. | | |
| gnss-AuxiliaryInformationSupport | Present or not present and value dependent on UE capabilities. | | |
| } | | | |
| } | | | |

**Table 7.3.1.1.3.3-9: locationCoordinateTypes (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.4.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| locationCoordinateTypes SEQUENCE { | | | |
| ellipsoidPoint | Dependent on UE capabilities | | |
| ellipsoidPointWithUncertaintyCircle | Dependent on UE capabilities | | |
| ellipsoidPointWithUncertaintyEllipse | Dependent on UE capabilities | | |
| polygon | Dependent on UE capabilities | | |
| ellipsoidPointWithAltitude | Dependent on UE capabilities | | |
| ellipsoidPointWithAltitudeAndUncertaintyEllipsoid | Dependent on UE capabilities | | |
| ellipsoidArc | Dependent on UE capabilities | | |
| } | | | |

**Table 7.3.1.1.3.3-10: velocityTypes (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.4.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| velocityTypes SEQUENCE { | | | |
| horizontalVelocity | Dependent on UE capabilities | | |
| horizontalWithVerticalVelocity | Dependent on UE capabilities | | |
| horizontalVelocityWithUncertainty | Dependent on UE capabilities | | |
| horizontalWithVerticalVelocityAndUncertainty | Dependent on UE capabilities | | |
| } | | | |

**Table 7.3.1.1.3.3-11: otdoa-ProvideCapabilities (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.5.1.7 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| otdoa-ProvideCapabilities SEQUENCE { | | | |
| otdoa-Mode | Dependent on UE capabilities | | |
| supportedBandListEUTRA SEQUENCE (SIZE (1..n)) OF SEQUENCE { | Shall be present if otdoa-ProvideCapabilities is present | Size n of SEQUENCE is dependent on UE capabilities | |
| bandEUTRA | Dependent on UE capabilities | | |
| } | | | |
| } | | | |

**Table 7.3.1.1.3.3-12: ecid-ProvideCapabilities (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.5.3.4 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ecid-ProvideCapabilities SEQUENCE { | | | |
| ecid-MeasSupported | Dependent on UE capabilities | | |
| } | | | |
| } | | | |

**Table 7.3.1.1.3.3-13: epdu-ProvideCapabilities (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.4.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| epdu-ProvideCapabilities SEQUENCE (SIZE (1)) OF SEQUENCE{ | | | |
| ePDU-Identifier SEQUENCE { | | | |
| ePDU-ID | 1 | OMA LPPe | |
| ePDU-Name | Present or not present. | | |
| } | | | |
| ePDU-Body | Set according to Table 7.3.1.1.3.3-16 | | |
| } | | | |

**Table 7.3.1.1.3.3-14: LPP Acknowledgement (step 2a, Table 7.3.1.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 2, Table 7.3.1.1.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

**Table 7.3.1.1.3.3-15: ePDU-Body OCTET STRING (step 1, Table 7.3.1.1.3.2-1)**

| Derivation Path: OMA-TS-LPPe-V1_0 [28] clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| OMA-LPPe-MessageExtension ::= SEQUENCE { | | | |
| lppeCompatibilityLevel | 0 | | |
| lppeVersion SEQUENCE { | | | |
| majorVersion | 1 | | |
| minorVersion | 0 | | |
| } | | | |
| lppeMode | normal | | |
| messageExtensionBody CHOICE { | | | |
| requestCapabilities SEQUENCE { | | | |
| commonIEsRequestCapabilities SEQUENCE { | | | |
| iP-Address-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| assistanceContainerSupportReq SEQUENCE { | Present | | |
| vendorOrOperatorIDList | Not present | | |
| } | | | |
| locationInformationContainerSupportReq SEQUENCE { | Present | | |
| vendorOrOperatorIDList | Not present | | |
| } | | | |
| relativeLocationChange-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| highAccuracyFormatCapabilitiesReq SEQUENCE { | Present | | |
| } | | | |
| segmentedAssistanceData-ReqCapabilities SEQUENCE { | Present | | |

| | | | |
|---|---|---|---|
| } | | | |
| referencePointCapabilitiesReq SEQUENCE { | Present | | |
| referencePointProviderSupportListReq | Not present | | |
| } | | | |
| scheduledLocation-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| accessCapabilitiesReq SEQUENCE { | Present | | |
| } | | | |
| segmentedLocationInformation-ReqCapabilities SEQUENCE { | Present | | |
| } | | | |
| } | | | |
| agnss-RequestCapabilities SEQUENCE { | | | |
| assistanceDataSupportListReq | Present | | |
| environmentObservationSupportListReq | Present | | |
| haGNSSsupportReq | Present | | |
| } | | | |
| otdoa-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| eotd-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| otdoa-utra-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| ecid-lte-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| ecid-gsm-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| ecid-utra-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| wlan-ap-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| ecid-wimax-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| sensor-RequestCapabilities SEQUENCE { | Present | | |
| } | | | |
| srn-RequestCapabilities SEQUENCE { | Present | | |
| capabilitiesRequestedFor | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.1.1.3.3-16: ePDU-Body OCTET STRING (step 2, Table 7.3.1.1.3.2-1)**

| Derivation Path: OMA-TS-LPPe-V1_0 [28] clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| OMA-LPPe-MessageExtension ::= SEQUENCE { | | | |
| lppeCompatibilityLevel | 0 | | |
| lppeVersion SEQUENCE { | | | |
| majorVersion | 1 | | |
| minorVersion | 0 | | |
| } | | | |
| lppeMode | normal | | |
| messageExtensionBody CHOICE { | | | |
| provideCapabilities SEQUENCE { | | | |
| commonIEsProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| agnss-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| otdoa-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |

| | | | |
|---|---|---|---|
| eotd-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| otdoa-utra-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| ecid-lte-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| ecid-gsm-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| ecid-utra-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| wlan-ap-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| ecid-wimax-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| sensor-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| srn-ProvideCapabilities | Present or not present and value dependent on UE capabilities. | | |
| } | | | |
| } | | | |
| } | | | |

## 7.3.2 LPP Transport

### 7.3.2.1 LPP Duplicated Message

#### 7.3.2.1.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE receives a LPP message carrying the same sequence number as that last received for the
         associated location session  }
    then { UE discards the LPP message }
}
```

#### 7.3.2.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 4.3.

[TS 36.355, clause 4.3.1]

A UE implementing LPP for the control plane solution shall support LPP reliable transport (including all three of duplicate detection, acknowledgement, and retransmission).

The following requirements in subclauses 4.3.2, 4.3.3, and 4.3.4 [LPP] for LPP reliable transport apply only when the capability is supported.

[TS 36.355, clause 4.3.2]

A sender shall include a sequence number in all LPP messages sent for a particular location session. The sequence number shall be distinct for different LPP messages sent in the same direction in the same location session.

…

A receiver shall record the most recent received sequence number for each location session. If a message is received carrying the same sequence number as that last received for the associated location session, it shall be discarded.

7.3.2.1.3 Test description

7.3.2.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: Not present.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

-

7.3.2.1.3.2 Test procedure sequence

**Table 7.3.2.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a LPP message of type Request Capabilities including a sequence number. | <-- | *DLInformationTransfer* (LPP REQUEST CAPABILITIES) | - | - |
| 2 | Immediately after step 1, the SS sends the same LPP message as in step 1. | <-- | *DLInformationTransfer* (LPP REQUEST CAPABILITIES) | - | - |
| 3 | The UE sends a LPP message of type Provide Capabilities including the UE positioning capabilities. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | - | - |
| 3a | IF the UE LPP message at step 3 includes an acknowledgment request THEN SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |
| 4 | The SS waits for 10 seconds to ensure the UE does not send another LPP message of type Provide Capabilities with the same transaction ID as received in step 1 or 2. | | | 1 | P |

7.3.2.1.3.3 Specific message contents

**Table 7.3.2.1.3.3-1: *DLInformationTransfer* (steps 1, 2, and 3a, Table 7.3.2.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.2.1.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.1.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1, 2 and 3a, Table 7.3.2.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Steps 1 and 2:** Set according to Table 7.3.2.1.3.3-3 | LPP Request Capabilities | |
| | **Step 3a:** Set according to Table 7.3.2.1.3.3-7 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.2.1.3.3-3: LPP Request Capabilities (steps 1 and 2, Table 7.3.2.1.3.2-1)**

| Derivation Path: Table 5.4-1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-1 with the following exceptions: | | | |
| sequenceNumber | 0 | | |

**Table 7.3.2.1.3.3-4: *ULInformationTransfer* (step 3, Table 7.3.2.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.2.1.3.3-5 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.1.3.3-5: UPLINK GENERIC NAS TRANSPORT (step 3, Table 7.3.2.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.2.1.3.3-6 | LPP Provide Capabilities | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 1 Table 7.3.2.1.3.2-1) | |

**Table 7.3.2.1.3.3-6: LPP Provide Capabilities (step 3, Table 7.3.2.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Capabilities message in step 1, Table 7.3.2.1.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |

| | | | |
|---|---|---|---|
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities-r9 SEQUENCE { | | | |
| commonIEsProvideCapabilities | Not present | | |
| a-gnss-ProvideCapabilities SEQUENCE{ | Dependent on UE capabilities | | |
| gnss-SupportList | | | |
| assistanceDataSupportList | | | |
| locationCoordinateTypes | | | |
| velocityTypes | | | |
| } | | | |
| otdoa-ProvideCapabilities | Dependent on UE capabilities | | |
| ecid-ProvideCapabilities | Dependent on UE capabilities | | |
| epdu-ProvideCapabilities | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.1.3.3-7: LPP Acknowledgement (step 3a, Table 7.3.2.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 3, Table 7.3.2.1.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

## 7.3.2.2 LPP Acknowledgment

### 7.3.2.2.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE receives a LPP message carrying an acknowledgement request indicator  }
    then { UE returns an acknowledgement response }
            }
```

#### 7.3.2.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 4.3.

[TS 36.355, clause 4.3.1]

A UE implementing LPP for the control plane solution shall support LPP reliable transport (including all three of duplicate detection, acknowledgement, and retransmission).

The following requirements in subclauses 4.3.2, 4.3.3, and 4.3.4 [LPP] for LPP reliable transport apply only when the capability is supported.

[TS 36.355, clause 4.3.3.1]

Upon reception of an LPP message which includes the IE *ackRequested* set to TRUE, a receiver returns an LPP message with an acknowledgement response, i.e., that includes the *ackIndicator* IE set to the same sequence number of the message being acknowledged.

An acknowledgment response may contain no LPP message body (in which case only the sequence number being acknowledged is significant); alternatively, the acknowledgment may be sent in an LPP message along with an LPP message body.

#### 7.3.2.2.3 Test description

##### 7.3.2.2.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: Not present.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

-

7.3.2.2.3.2 Test procedure sequence

**Table 7.3.2.2.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a LPP message of type Request Capabilities including a request for acknowledgement. | <-- | *DLInformationTransfer* (LPP REQUEST CAPABILITIES) | - | - |
| 2<br>Option 1 | Option 1:<br>The UE sends an acknowledgement along with an LPP message of type Provide Capabilities. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES, incl. acknowledgement response) | 1 | P |
| 2<br>Option 2 | Option 2:<br>The UE sends a LPP Acknowledgement response, followed by a LPP message of type Provide Capabilities. | --><br><br>--> | *ULInformationTransfer* (LPP ACKNOWLEDGEMENT)<br>*ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | 1 | P |
| 3 | IF<br>the UE LPP message at step 2 includes an acknowledgment request<br>THEN<br>SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |

7.3.2.2.3.3 Specific message contents

**Table 7.3.2.2.3.3-1: *DLInformationTransfer* (steps 1, and 3, Table 7.3.2.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.2.2.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.2.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1, and 3, Table 7.3.2.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 1:** Set according to Table 7.3.2.2.3.3-3 | LPP Request Capabilities | |
| | **Step 3:** Set according to Table 7.3.2.2.3.3-8 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.2.2.3.3-3: LPP Request Capabilities (step 1, Table 7.3.2.2.3.2-1)**

| Derivation Path: Table 5.4-1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-1 with the following exceptions: | | | |
| sequenceNumber | 0 | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |

**Table 7.3.2.2.3.3-4: *ULInformationTransfer* (step 2, Table 7.3.2.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.2.2.3.3-5 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.2.3.3-5: UPLINK GENERIC NAS TRANSPORT (step 2, Table 7.3.2.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 2:** Set according to Table 7.3.2.2.3.3-6 | LPP Provide Capabilities | |
| | **Step 2 (Option 2),** Set according to Table 7.3.2.2.3.3-7 | LPP Acknowledgement | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message | |

**Table 7.3.2.2.3.3-6: LPP Provide Capabilities (step 2, Table 7.3.2.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Capabilities message in step 1, Table 7.3.2.2.3.2-1. | |

| | | | |
|---|---|---|---|
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | Present, or not present.<br>Present for Option 1. | | |
| ackRequested | TRUE or FALSE | | |
| ackIndicator | 0 (Option 1)<br>Not present (Option 2) | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities-r9 SEQUENCE { | | | |
| commonIEsProvideCapabilities | Not present | | |
| a-gnss-ProvideCapabilities SEQUENCE{ | Dependent on UE capabilities | | |
| gnss-SupportList | | | |
| assistanceDataSupportList | | | |
| locationCoordinateTypes | | | |
| velocityTypes | | | |
| } | | | |
| otdoa-ProvideCapabilities | Dependent on UE capabilities | | |
| ecid-ProvideCapabilities | Dependent on UE capabilities | | |
| epdu-ProvideCapabilities | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.2.3.3-7: LPP Acknowledgement (step 2 – Option 2, Table 7.3.2.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | FALSE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | 0 | | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

**Table 7.3.2.2.3.3-8: LPP Acknowledgement (step 3, Table 7.3.2.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 2, Table 7.3.2.2.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

## 7.3.2.3 LPP Retransmission

### 7.3.2.3.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE does not receive an LPP acknowledgement for an LPP message which requires
         acknowledement }
    then { UE retransmits the LPP message up to three times. If still unacknowledged after that, the
           UE aborts all LPP activity for the associated session }
            }
```

### 7.3.2.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 4.3.

[TS 36.355, clause 4.3.1]

A UE implementing LPP for the control plane solution shall support LPP reliable transport (including all three of duplicate detection, acknowledgement, and retransmission).

The following requirements in subclauses 4.3.2, 4.3.3, and 4.3.4 [LPP] for LPP reliable transport apply only when the capability is supported.

[TS 36.355, clause 4.3.4.1]

When an LPP message which requires acknowledgement is sent and not acknowledged, it is resent by the sender following a timeout period up to three times. If still unacknowledged after that, the sender aborts all LPP activity for the associated session.

### 7.3.2.3.3 Test description

#### 7.3.2.3.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: Not present.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

- Method of triggering an LPP message with acknowledgement request.

7.3.2.3.3.2 Test procedure sequence

**Table 7.3.2.3.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a LPP message of type Request Capabilities. | <-- | *DLInformationTransfer* (LPP REQUEST CAPABILITIES) | - | - |
| 2 | The UE sends a LPP message of type Provide Capabilities including a request for acknowledgement along with a sequence number.<br>NOTE: This requires a method of triggering an acknowledgement request. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | - | - |
| 3 | SS does not send an acknowldgement | | | - | - |
| 4 | After an implementation specific timeout period, the UE retransmitts the LPP message from step 2 and includes the same sequence number as in step 2. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | - | - |
| 5 | SS does not send an acknowldgement | | | - | - |
| 6 | After an implementation specific timeout period, the UE retransmitts the LPP message from step 2 and includes the same sequence number as in step 2. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | - | - |
| 7 | SS does not send an acknowldgement | | | - | - |
| 8 | After an implementation specific timeout period, the UE retransmitts the LPP message from step 2 and includes the same sequence number as in step 2. | --> | *ULInformationTransfer* (LPP PROVIDE CAPABILITIES) | - | - |
| 9 | SS does not send an acknowldgement | | | | |
| 10 | UE aborts all procedures and activity associated with LPP support for the location session.<br>SS waits for 10 seconds to ensure the UE does not send another LPP message. | | | 1 | P |

7.3.2.3.3.3 Specific message contents

**Table 7.3.2.3.3.3-1: *DLInformationTransfer* (step 1, Table 7.3.2.3.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.2.3.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.3.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (step 1, Table 7.3.2.3.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.2.3.3.3-3 | LPP Request Capabilities | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.2.3.3.3-3: LPP Request Capabilities (step 1, Table 7.3.2.3.3.2-1)**

| Derivation Path: Table 5.4-1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-1. | | | |

**Table 7.3.2.3.3.3-4: *ULInformationTransfer* (steps 2, 4, 6, and 8, Table 7.3.2.3.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.2.3.3.3-5 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.2.3.3.3-5: UPLINK GENERIC NAS TRANSPORT (steps 2, 4, 6, and 8, Table 7.3.2.3.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.2.3.3.3-6 | LPP Provide Capabilities | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message | |

**Table 7.3.2.3.3.3-6: LPP Provide Capabilities (steps 2, 4, 6, and 8, Table 7.3.2.3.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Capabilities message in step 1 Table 7.3.2.3.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | | | |

| | | | |
|---|---|---|---|
| ackRequested | TRUE | Requires a method to set this to TRUE | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideCapabilities-r9 SEQUENCE { | | | |
| commonIEsProvideCapabilities | Not present | | |
| a-gnss-ProvideCapabilities SEQUENCE{ | Dependent on UE capabilities | | |
| gnss-SupportList | | | |
| assistanceDataSupportList | | | |
| locationCoordinateTypes | | | |
| velocityTypes | | | |
| } | | | |
| otdoa-ProvideCapabilities | Dependent on UE capabilities | | |
| ecid-ProvideCapabilities | Dependent on UE capabilities | | |
| epdu-ProvideCapabilities | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

## 7.3.3 LPP Error Handling

### 7.3.3.1 LPP Requested Method not Supported – UE-Assisted

#### 7.3.3.1.1 Test Purpose (TP)

(1)

```
with { a UE supporting at least one of UE-assisted GNSS, UE-assisted OTDOA, or UE-assisted ECID,
       but not all of them }
and with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE receives a LPP message requesting at least one location method not supported }
    then { the UE provides location information for the supported methods}
          }
```

#### 7.3.3.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clauses 5.3.3 and 5.4.3.

[TS 36.355, clause 5.3.3]

Upon receiving a *RequestLocationInformation* message, the target device shall:

1> if the requested information is compatible with the target device capabilities and configuration:

[…]

1> otherwise:

2> if one or more positioning methods are included that the target device does not support:

3> continue to process the message as if it contained only information for the supported positioning methods;

3> handle the signaling content of the unsupported positioning methods by LPP error detection as in 5.4.3.

[TS 36.355, clause 5.4.3]

Upon receiving any LPP message, the receiving entity shall attempt to decode the message and verify the presence of any errors and:

1> if the message type is an LPP *RequestAssistanceData* or *RequestLocationInformation* and some or all of the requested information is not supported:

2> return any information that can be provided in a normal response, which includes indications on other information that is not supported.

#### 7.3.3.1.3 Test description

##### 7.3.3.1.3.1 Pre-test conditions

System Simulator:

- Subtests 1-4: Cell 1.
- Subtest 5 and 7: Cells 1, 2 and 4, as specified in 5.2.2.
- Subtest 6: Cells 1, 2 and 4, as specified in 5.2.3.
- Satellite signals (Subtests 1-4, 7): As specified in 5.2.1.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

-

##### 7.3.3.1.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the positioning method supported by the UE. Each sub-test case is identified by a sub-test case number as defined in Table 5.1-1.

**Table 7.3.3.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a LPP message of type Provide Assistance Data. | <-- | *DLInformationTransfer* (LPP PROVIDE ASSISTANCE DATA) | - | - |
| 2 | The SS sends a LPP message of type Request Location Information including all specified positioning methods. | <-- | *DLInformationTransfer* (LPP REQUEST LOCATION INFORMATION) | - | - |
| 3 | The UE sends a LPP message of type Provide Location Information including information for the supported method(s). | --> | *ULInformationTransfer* (LPP PROVIDE LOCATION INFORMATION) | 1 | P |
| 3a | IF the UE LPP message at step 3 includes an acknowledgment request THEN SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |

7.3.3.1.3.3 Specific message contents

**Table 7.3.3.1.3.3-1: *DLInformationTransfer* (steps 1, 2 and 3a, Table 7.3.3.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.3.1.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.3.1.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1, 2 and 3a, Table 7.3.3.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 1 :** Set according to Table 7.3.3.1.3.3-3 | LPP Provide Assistance Data | |
| | **Step 2 :** Set according to Table 7.3.3.1.3.3-4 | LPP Request Location Information | |
| | **Step 3a:** Set according to Table 7.3.3.1.3.3-8 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.3.1.3.3-3: LPP Provide Assistance data (step 1, Table 7.3.3.1.3.2-1)**

| Derivation Path: Table 5.4-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-2 with the following exceptions: | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | | |
| } | | | |
| a-gnss-ProvideAssistanceData | As defined in clause 5.4 | Present for all sub-tests | |
| otdoa-ProvideAssistanceData | As defined in clause 5.4 | Present for all sub-tests | |

**Table 7.3.3.1.3.3-4: LPP Request Location Information (step 2, Table 7.3.3.1.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| locationInformationType | locationMeasurementsRequired | | |
| a-gnss-RequestLocationInformation | As defined in Table 5.4-5 | Present for all sub-tests | |
| gnss-ids | bits 0 & 4 = 1 | | |
| otdoa-RequestLocationInformation | As defined in Table 5.4-5 | Present for all sub-tests | |
| ecid-RequestLocationInformation | As defined in Table 5.4-6 | Present for all sub-tests | |
| requestedMeasurements | bits 0, 1, 2 = 1 | | |

**Table 7.3.3.1.3.3-5: *ULInformationTransfer* (step 3, Table 7.3.3.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.3.1.3.3-6 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.3.1.3.3-6: UPLINK GENERIC NAS TRANSPORT (step 3, Table 7.3.3.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.3.1.3.3-7 | LPP Provide Location Information | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 2 Table 7.3.3.1.3.2-1) | |

**Table 7.3.3.1.3.3-7: LPP Provide Location Information (step 3, Table 7.3.3.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| Initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in LPP Request Location Information message in step 2, Table 7.3.3.1.3.1-1 | |
| } | | | |

| | | | |
|---|---|---|---|
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation-r9 SEQUENCE { | | | |
| commonIEsProvideLocationInformation SEQUENCE { | | | |
| locationEstimate | Not present | | |
| velocityEstimate | Not present | | |
| locationError | May be present | | |
| } | | | |
| a-gnss-ProvideLocationInformation | Present if UE supports UE-assisted A-GNSS | | |
| otdoa-ProvideLocationInformation | Present if UE supports UE-assisted OTDOA | | |
| ecid-ProvideLocationInformation | Present if UE supports UE-assisted ECID | | |
| epdu-ProvideLocationInformation | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.3.1.3.3-8: LPP Acknowledgement (step 3a, Table 7.3.3.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 3, Table 7.3.3.1.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

## 7.3.4 LPP Positioning Procedures

### 7.3.4.1 E-SMLC Initiated Assistance Data Delivery followed by Location Information Transfer: UE-Based

#### 7.3.4.1.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE receives assistance data and a location request for UE-based  }
    then { UE sends a PROVIDE LOCATION INFORMATION  message containing a location estimate }
           }
```

#### 7.3.4.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 5.2.4, 5.3.3 and 5.3.4.

[TS 36.355, clause 5.2.4]

Upon receiving a *ProvideAssistanceData* message, the target device shall:

1> for each positioning method contained in the message:

2> deliver the related assistance data to upper layers.

[TS 36.355, clause 5.3.3]

Upon receiving a *RequestLocationInformation* message, the target device shall:

1> if the requested information is compatible with the target device capabilities and configuration:

2> include the requested information in a *ProvideLocationInformation* message;

2> set the IE *LPP-TransactionID* in the response to the same value as the IE *LPP-TransactionID* in the received message;

2> deliver the *ProvideLocationInformation* message to lower layers for transmission.

1> otherwise:

[…]

[TS 36.355, clause 5.3.4]

When triggered to transmit *ProvideLocationInformation* message, the target device shall:

1> for each positioning method contained in the message:

2> set the corresponding IE to include the available location information;

1> deliver the response to lower layers for transmission.

#### 7.3.4.1.3 Test description

##### 7.3.4.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: As specified in 5.2.1.

UE:

- The UE shall begin the test with no assistance data stored.

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

-

### 7.3.4.1.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |

**Table 7.3.4.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The stored GNSS assistance data in the UE are cleared. | <-- | RESET UE POSITIONING STORED INFORMATION | - | - |
| 2 | The SS sends a LPP message of type Provide Assistance Data. | <-- | *DLInformationTransfer* (LPP PROVIDE ASSISTANCE DATA) | - | - |
| 3 | The SS sends a LPP message of type Request Location Information including a request for an A-GNSS location estimate. | <-- | *DLInformationTransfer* (LPP REQUEST LOCATION INFORMATION) | - | - |
| 4 | The UE sends a LPP message of type Provide Location Information including a location estimate. | --> | *ULInformationTransfer* (LPP PROVIDE LOCATION INFORMATION) | 1 | P |
| 4a | IF the UE LPP message at step 4 includes an acknowledgment request THEN SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |

### 7.3.4.1.3.3 Specific message contents

**Table 7.3.4.1.3.3-1: RESET UE POSITIONING STORED INFORMATION (step 1, Table 7.3.4.1.3.2-1)**

| Derivation Path: 36.509 clause 6.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| UE Positioning Technology | 0 0 0 0 0 0 0 0 | GNSS | |

**Table 7.3.4.1.3.3-2: *DLInformationTransfer* (steps 2, 3 and 4a, Table 7.3.4.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.1.3.3-3 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.1.3.3-3: DOWNLINK GENERIC NAS TRANSPORT (steps 2, 3 and 4a, Table 7.3.4.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 2:** Set according to Table 7.3.4.1.3.3-4 | LPP Provide Assistance Data | |
| | **Step 3:** Set according to Table 7.3.4.1.3.3-5 | LPP Request Location Information | |
| | **Step 4a:** Set according to Table 7.3.4.1.3.3-9 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.4.1.3.3-4: LPP Provide Assistance data (step 2, Table 7.3.4.1.3.2-1)**

| Derivation Path: Table 5.4-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-2 with the following exceptions: | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | | |
| } | | | |

**Table 7.3.4.1.3.3-5: LPP Request Location Information (step 3, Table 7.3.4.1.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| locationInformationType | locationEstimateRequired | | |

**Table 7.3.4.1.3.3-6: *ULInformationTransfer* (step 4, Table 7.3.4.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.1.3.3-7 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.1.3.3-7: UPLINK GENERIC NAS TRANSPORT (step 4, Table 7.3.4.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.4.1.3.3-8 | LPP Provide Location Information | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 3 Table 7.3.4.1.3.2-1) | |

**Table 7.3.4.1.3.3-8: LPP Provide Location Information (step 4, Table 7.3.4.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in LPP Request Location Information message in step 3, Table 7.3.4.1.3.1-1 | |
| } | | | |

| | | | |
|---|---|---|---|
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation-r9 SEQUENCE { | | | |
| commonIEsProvideLocationInformation SEQUENCE { | Present | | |
| locationEstimate | | | |
| velocityEstimate | | | |
| locationError | Not present | | |
| } | | | |
| a-gnss-ProvideLocationInformation SEQUENCE { | Present | | |
| gnss-SignalMeasurementInformation | Not present | | |
| gnss-LocationInformation SEQUENCE { | | | |
| measurementReferenceTime | | | |
| agnss-List | | | |
| } | | | |
| gnss-Error | Not present | | |
| } | | | |
| otdoa-ProvideLocationInformation | Not present | | |
| ecid-ProvideLocationInformation | Not present | | |
| epdu-ProvideLocationInformation | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.1.3.3-9: LPP Acknowledgement (step 4a, Table 7.3.4.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 4, Table 7.3.4.1.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

## 7.3.4.2 E-SMLC Initiated Assistance Data Delivery followed by Location Information Transfer: UE-Assisted

### 7.3.4.2.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE receives assistance data and a location request for UE-assisted  }
    then { UE sends a PROVIDE LOCATION INFORMATION  message containing location measurements }
           }
```

### 7.3.4.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 5.2.4, 5.3.3 and 5.3.4.

[TS 36.355, clause 5.2.4]

Upon receiving a *ProvideAssistanceData* message, the target device shall:

1> for each positioning method contained in the message:

2> deliver the related assistance data to upper layers.

[TS 36.355, clause 5.3.3]

Upon receiving a *RequestLocationInformation* message, the target device shall:

1> if the requested information is compatible with the target device capabilities and configuration:

2> include the requested information in a *ProvideLocationInformation* message;

2> set the IE *LPP-TransactionID* in the response to the same value as the IE *LPP-TransactionID* in the received message;

2> deliver the *ProvideLocationInformation* message to lower layers for transmission.

1> otherwise:

[…]

[TS 36.355, clause 5.3.4]

When triggered to transmit *ProvideLocationInformation* message, the target device shall:

1> for each positioning method contained in the message:

2> set the corresponding IE to include the available location information;

1> deliver the response to lower layers for transmission.

### 7.3.4.2.3 Test description

#### 7.3.4.2.3.1 Pre-test conditions

System Simulator:

- Subtests 1-4: Cell 1.
- Subtest 5 and 7: Cells 1, 2 and 4, as specified in 5.2.2.
- Subtest 6: Cells 1, 2 and 4, as specified in 5.2.3.

- Satellite signals (Subtests 1-4, 7): As specified in 5.2.1.

UE:

- The UE shall begin the test with no assistance data stored.

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

-

#### 7.3.4.2.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the positioning method supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |
| 5 | UE supporting OTDOA |
| 6 | UE supporting ECID |
| 7 | UE supporting GNSS and OTDOA |

**Table 7.3.4.2.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | IF<br>sub-test 1 or 2 or 3 or 4 or 7<br>THEN<br>The stored GNSS assistance data in the UE are cleared. | <-- | RESET UE POSITIONING STORED INFORMATION | - | - |
| 1a | IF<br>Sub-test 5 or 7<br>THEN<br>The stored OTDOA assistance data in the UE are cleared. | <-- | RESET UE POSITIONING STORED INFORMATION | - | - |
| 2 | IF NOT<br>sub-test 6<br>THEN<br>The SS sends a LPP message of type Provide Assistance Data. | <-- | *DLInformationTransfer*<br>(LPP PROVIDE ASSISTANCE DATA) | - | - |
| 3 | The SS sends a LPP message of type Request Location Information including a request for location measurements. | <-- | *DLInformationTransfer*<br>(LPP REQUEST LOCATION INFORMATION) | - | - |
| 4 | The UE sends a LPP message of type Provide Location Information including location measurements. | --> | *ULInformationTransfer*<br>(LPP PROVIDE LOCATION INFORMATION) | 1 | P |
| 4a | IF<br>the UE LPP message at step 4 includes an acknowledgment request<br>THEN<br>SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer*<br>(LPP ACKNOWLEDGEMENT) | - | - |

7.3.4.2.3.3 Specific message contents

**Table 7.3.4.2.3.3-1: RESET UE POSITIONING STORED INFORMATION (step 1, Table 7.3.4.2.3.2-1)**

| Derivation Path: 36.509 clause 6.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| UE Positioning Technology | 0 0 0 0 0 0 0 0 | GNSS | |

**Table 7.3.4.2.3.3-2: RESET UE POSITIONING STORED INFORMATION (step 1a, Table 7.3.4.2.3.2-1)**

| Derivation Path: 36.509 clause 6.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| UE Positioning Technology | 0 0 0 0 0 0 0 1 | OTDOA | |

**Table 7.3.4.2.3.3-3: *DLInformationTransfer* (steps 2, 3 and 4a, Table 7.3.4.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.2.3.3-4 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.2.3.3-4: DOWNLINK GENERIC NAS TRANSPORT (steps 2, 3 and 4a, Table 7.3.4.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 2:** Set according to Table 7.3.4.2.3.3-5 | LPP Provide Assistance Data | |
| | **Step 3:** Set according to Table 7.3.4.2.3.3-6 | LPP Request Location Information | |
| | **Step 4a:** Set according to Table 7.3.4.2.3.3-10 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.4.2.3.3-5: LPP Provide Assistance data (step 2, Table 7.3.4.2.3.2-1)**

| Derivation Path: Table 5.4-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-2 with the following exceptions: | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | | |
| } | | | |

**Table 7.3.4.2.3.3-6: LPP Request Location Information (step 3, Table 7.3.4.2.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| locationInformationType | locationMeasurementsRequired | | |

**Table 7.3.4.2.3.3-7: *ULInformationTransfer* (step 4, Table 7.3.4.2.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.2.3.3-8 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.2.3.3-8: UPLINK GENERIC NAS TRANSPORT (step 4, Table 7.3.4.2.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | Set according to Table 7.3.4.2.3.3-9 | LPP Provide Location Information | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (step 3 Table | |

| | | | |
|---|---|---|---|
| | | 7.3.4.2.3.2-1) | |

**Table 7.3.4.2.3.3-9: LPP Provide Location Information (step 4, Table 7.3.4.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in LPP Request Location Information message in step 3, Table 7.3.4.2.3.1-1 | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation-r9 SEQUENCE { | | | |
| commonIEsProvideLocationInformation | Not present | | |
| a-gnss-ProvideLocationInformation | Present for sub-tests 1-4, 7 | | |
| otdoa-ProvideLocationInformation | Present for sub-tests 5, 7 | | |
| ecid-ProvideLocationInformation | Present for sub-test 6 | | |
| epdu-ProvideLocationInformation | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.2.3.3-10: LPP Acknowledgement (step 4a, Table 7.3.4.2.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 4, Table 7.3.4.2.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

### 7.3.4.3 E-SMLC Initiated Position Measurement without assistance data: UE-Based

#### 7.3.4.3.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when {    UE has no assistance data stored and receives a location request for UE-based and the UE
            requires assistance data in order to fulfill the location request }
    then {  UE sends a REQUEST ASSISTANCE DATA message followed by a PROVIDE LOCATION INFORMATION
            message containing a location estimate }
            }
```

#### 7.3.4.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 5.2.3, 5.2.4, 5.3.3 and 5.3.4.

[TS 36.355, clause 5.2.3]

When triggered to transmit a *RequestAssistanceData* message, the target device shall:

1> set the IEs for the positioning-method-specific request for assistance data to request the data indicated by upper layers.

[TS 36.355, clause 5.2.4]

Upon receiving a *ProvideAssistanceData* message, the target device shall:

1> for each positioning method contained in the message:

2> deliver the related assistance data to upper layers.

[TS 36.355, clause 5.3.3]

Upon receiving a *RequestLocationInformation* message, the target device shall:

1> if the requested information is compatible with the target device capabilities and configuration:

2> include the requested information in a *ProvideLocationInformation* message;

2> set the IE *LPP-TransactionID* in the response to the same value as the IE *LPP-TransactionID* in the received message;

2> deliver the *ProvideLocationInformation* message to lower layers for transmission.

1> otherwise:

[…]

[TS 36.355, clause 5.3.4]

When triggered to transmit *ProvideLocationInformation* message, the target device shall:

1> for each positioning method contained in the message:

2> set the corresponding IE to include the available location information;

1> deliver the response to lower layers for transmission.

7.3.4.3.3 Test description

7.3.4.3.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: As specified in 5.2.1.

UE:

- The UE shall begin the test with no assistance data stored.

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

- Method of triggering an LPP Request Assistance Data message.

7.3.4.3.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the GNSS supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |

**Table 7.3.4.3.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The stored GNSS assistance data in the UE are cleared. | <-- | RESET UE POSITIONING STORED INFORMATION | - | - |
| 2 | The SS sends a LPP message of type Request Location Information including a request for an A-GNSS location estimate. | <-- | *DLInformationTransfer* (LPP REQUEST LOCATION INFORMATION) | - | - |
| 3 | The UE sends a LPP message of type Request Assistance Data including a request for GNSS assistance data.<br>NOTE: This requires a method of triggering an Request Assistance Data message. | --> | *ULInformationTransfer* (LPP REQUEST ASSISTANCE DATA) | 1 | P |
| 4 | The SS sends a LPP message of type Provide Assistance Data. | <-- | *DLInformationTransfer* (LPP PROVIDE ASSISTANCE DATA) | - | - |
| 5 | The UE sends a LPP message of type Provide Location Information including a location estimate. | --> | *ULInformationTransfer* (LPP PROVIDE LOCATION INFORMATION) | 1 | P |
| 5a | IF<br>the UE LPP message at step 5 includes an acknowledgment request<br>THEN<br>SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer* (LPP ACKNOWLEDGEMENT) | - | - |

7.3.4.3.3.3 Specific message contents

**Table 7.3.4.3.3.3-1: RESET UE POSITIONING STORED INFORMATION (step 1, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.509 clause 6.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| UE Positioning Technology | 0 0 0 0 0 0 0 0 | GNSS | |

**Table 7.3.4.3.3.3-2: *DLInformationTransfer* (steps 2, 4 and 5a, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.3.3.3-3 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.3.3.3-3: DOWNLINK GENERIC NAS TRANSPORT (steps 2, 4 and 5a, Table 7.3.4.3.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 2:** Set according to Table 7.3.4.3.3.3-4 | LPP Request Location Information | |
| | **Step 4:** Set according to Table 7.3.4.3.3.3-9 | LPP Provide Assistance Data | |
| | **Step 5a:** Set according to Table 7.3.4.3.3.3-11 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.4.3.3.3-4: LPP Request Location Information (step 2, Table 7.3.4.3.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| locationInformationType | locationEstimateRequired | | |
| a-gnss-RequestLocationInformation | Set according to Table 7.3.4.3.3.3-5 | | |

**Table 7.3.4.3.3.3-5: A-GNSS Request Location Information (step 2, Table 7.3.4.3.3.2-1)**

| Derivation Path: Table 5.4-4 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-4 with the following exceptions: | | | |
| assistanceAvailability | TRUE | | |

**Table 7.3.4.3.3.3-6: *ULInformationTransfer* (steps 3 and 5, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.3.3.3-7 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.3.3.3-7: UPLINK GENERIC NAS TRANSPORT (steps 3 and 5, Table 7.3.4.3.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 3:** Set according to Table 7.3.4.3.3.3-8 | LPP Request Assistance Data | |
| | **Step 5:** Set according to Table 7.3.4.3.3.3-10 | LPP Provide Location Information | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (steps 2 and 4 Table 7.3.4.3.3.2-1) | |

**Table 7.3.4.3.3.3-8: LPP Request Assistance Data (step 3, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |

| | | | |
|---|---|---|---|
| initiator | targetDevice | | |
| transactionNumber | (0..255) | | |
| } | | | |
| endTransaction | FALSE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | Present or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| requestAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| requestAssistanceData-r9 SEQUENCE { | | | |
| commonIEsRequestAssistanceData | | | |
| a-gnss-RequestAssistanceData | Present. | | |
| otdoa-RequestAssistanceData | | | |
| epdu-RequestAssistanceData | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.3.3.3-9: LPP Provide Assistance Data (step 4, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | targetDevice | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Assistance Data message in step 3 Table 7.3.4.3.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | Present if acknowledgement field is included by the UE at step 3, Table 7.3.4.3.3.2-1. | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value as the sequenceNumber in step 3, Table 7.3.4.3.3.2-1. | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData-r9 SEQUENCE { | | | |
| a-gnss-ProvideAssistanceData | The SS provides the assistance data requested by the UE at step 3, Table 7.3.4.3.3.2-1 which are available according to TS | | |

| | | | |
|---|---|---|---|
| | 37.571-5 [12]. | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.3.3.3-10: LPP Provide Location Information (step 5, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in LPP Request Location Information message in step 2, Table 7.3.4.3.3.1-1 | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation-r9 SEQUENCE { | | | |
| commonIEsProvideLocationInformation SEQUENCE { | Present | | |
| locationEstimate | | | |
| velocityEstimate | | | |
| locationError | Not present | | |
| } | | | |
| a-gnss-ProvideLocationInformation SEQUENCE { | present | | |
| gnss-SignalMeasurementInformation | Not present | | |
| gnss-LocationInformation SEQUENCE { | | | |
| measurementReferenceTime | | | |
| agnss-List | | | |
| } | | | |
| gnss-Error | Not present | | |
| } | | | |
| otdoa-ProvideLocationInformation | Not present | | |
| ecid-ProvideLocationInformation | Not present | | |
| epdu-ProvideLocationInformation | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.3.3.3-11: LPP Acknowledgement (step 5a, Table 7.3.4.3.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 5, Table 7.3.4.3.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

## 7.3.4.4 E-SMLC Initiated Position Measurement without assistance data: UE-Assisted

### 7.3.4.4.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when {    UE has no assistance data stored and receives a location request for UE-assisted and the
            UE requires assistance data in order to fulfill the location request }
    then {  UE sends a REQUEST ASSISTANCE DATA message followed by a PROVIDE LOCATION INFORMATION
            message containing location measurements }
            }
```

### 7.3.4.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 5.2.3, 5.2.4, 5.3.3 and 5.3.4.

[TS 36.355, clause 5.2.3]

When triggered to transmit a *RequestAssistanceData* message, the target device shall:

1> set the IEs for the positioning-method-specific request for assistance data to request the data indicated by upper layers.

[TS 36.355, clause 5.2.4]

Upon receiving a *ProvideAssistanceData* message, the target device shall:

1> for each positioning method contained in the message:

2> deliver the related assistance data to upper layers.

[TS 36.355, clause 5.3.3]

Upon receiving a *RequestLocationInformation* message, the target device shall:

1> if the requested information is compatible with the target device capabilities and configuration:

2> include the requested information in a *ProvideLocationInformation* message;

2> set the IE *LPP-TransactionID* in the response to the same value as the IE *LPP-TransactionID* in the received message;

2> deliver the *ProvideLocationInformation* message to lower layers for transmission.

1> otherwise:

[…]

[TS 36.355, clause 5.3.4]

When triggered to transmit *ProvideLocationInformation* message, the target device shall:

1> for each positioning method contained in the message:

2> set the corresponding IE to include the available location information;

1> deliver the response to lower layers for transmission.

### 7.3.4.4.3 Test description

#### 7.3.4.4.3.1 Pre-test conditions

System Simulator:

- Subtests 1-4: Cell 1.
- Subtest 5 and 7: Cells 1, 2 and 4, as specified in 5.2.2.
- Satellite signals (Subtests 1-4, 7): As specified in 5.2.1.

UE:

- The UE shall begin the test with no assistance data stored.

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP 36.508 [8].

Related PICS/PIXIT Statements:

- Method of triggering an LPP Request Assistance Data message.

#### 7.3.4.4.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the positioning method supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |
| 5 | UE supporting OTDOA |
| 7 | UE supporting GNSS and OTDOA |

**Table 7.3.4.4.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | IF<br>sub-test 1 or 2 or 3 or 4 or 7<br>THEN<br>The stored GNSS assistance data in the UE are cleared. | <-- | RESET UE POSITIONING STORED INFORMATION | - | - |

| | | | | | |
|---|---|---|---|---|---|
| 1a | IF<br>Sub-test 5 or 7<br>THEN<br>The stored OTDOA assistance data in the UE are cleared. | <-- | RESET UE POSITIONING STORED INFORMATION | - | - |
| 2 | The SS sends a LPP message of type Request Location Information including a request for location measurements. | <-- | *DLInformationTransfer*<br>(LPP REQUEST LOCATION INFORMATION) | - | - |
| 3 | The UE sends a LPP message of type Request Assistance Data including a request for GNSS and/or OTDOA assistance data.<br>NOTE: This requires a method of triggering an Request Assistance Data message. | --> | *ULInformationTransfer*<br>(LPP REQUEST ASSISTANCE DATA) | 1 | P |
| 4 | The SS sends a LPP message of type Provide Assistance Data. | <-- | *DLInformationTransfer*<br>(LPP PROVIDE ASSISTANCE DATA) | - | - |
| 5 | The UE sends a LPP message of type Provide Location Information including location measurements. | --> | *ULInformationTransfer*<br>(LPP PROVIDE LOCATION INFORMATION) | 1 | P |
| 5a | IF<br>the UE LPP message at step 5 includes an acknowledgment request<br>THEN<br>SS sends a LPP Acknowledgement response. | <-- | *DLInformationTransfer*<br>(LPP ACKNOWLEDGEMENT) | - | - |

7.3.4.4.3.3 Specific message contents

**Table 7.3.4.4.3.3-1: RESET UE POSITIONING STORED INFORMATION (step 1, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.509 clause 6.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| UE Positioning Technology | 0 0 0 0 0 0 0 0 | GNSS | |

**Table 7.3.4.4.3.3-2: RESET UE POSITIONING STORED INFORMATION (step 1a, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.509 clause 6.9 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| UE Positioning Technology | 0 0 0 0 0 0 0 1 | OTDOA | |

**Table 7.3.4.4.3.3-3: *DLInformationTransfer* (steps 2, 4 and 5a, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.4.3.3-4 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.4.3.3-4: DOWNLINK GENERIC NAS TRANSPORT (steps 2, 4 and 5a, Table 7.3.4.4.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 2:** Set according to Table 7.3.4.4.3.3-5 | LPP Request Location Information | |
| | **Step 4:** Set according to Table 7.3.4.4.3.3-10 | LPP Provide Assistance Data | |
| | **Step 5a:** Set according to Table 7.3.4.4.3.3-12 | LPP Acknowledgement | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.4.4.3.3-5: LPP Request Location Information (step 2, Table 7.3.4.4.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| locationInformationType | locationMeasurementsRequired | | |
| a-gnss-RequestLocationInformation | Set according to Table 7.3.4.4.3.3-6 | | |

**Table 7.3.4.4.3.3-6: A-GNSS Request Location Information (step 2, Table 7.3.4.4.3.2-1)**

| Derivation Path: Table 5.4-4 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-4 with the following exceptions: | | | |
| assistanceAvailability | TRUE | | |

**Table 7.3.4.4.3.3-7: *ULInformationTransfer* (steps 3 and 5, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ULInformationTransfer ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| ulInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.4.4.3.3-8 | UPLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.4.3.3-8: UPLINK GENERIC NAS TRANSPORT (steps 3 and 5, Table 7.3.4.4.3.2-1)**

| Derivation Path: 24.301 Table 8.2.32.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Uplink generic NAS transport message identity | 01101001 | Uplink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 3:** Set according to Table 7.3.4.4.3.3-9 | LPP Request Assistance Data | |
| | **Step 5:** Set according to Table 7.3.4.4.3.3-11 | LPP Provide Location Information | |
| Addional information | present | The UE includes the Routing Identifier received in the Additional Information IE of the DOWNLINK GENERIC NAS TRANSPORT message (steps 2 and 4 Table 7.3.4.4.3.2-1) | |

**Table 7.3.4.4.3.3-9: LPP Request Assistance Data (step 3, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | targetDevice | | |
| transactionNumber | (0..255) | | |
| } | | | |
| endTransaction | FALSE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | Present or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| requestAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| requestAssistanceData-r9 SEQUENCE { | | | |
| commonIEsRequestAssistanceData | | | |
| a-gnss-RequestAssistanceData | Present for sub-tests 1-4,7 | | |
| otdoa-RequestAssistanceData | Present for sub-test 5,7 | | |
| epdu-RequestAssistanceData | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.4.3.3-10: LPP Provide Assistance Data (step 4, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | targetDevice | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in the LPP Request Assistance Data message in step 3 Table 7.3.4.4.3.2-1. | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | Present if acknowledgement field is included by the UE at step 3, Table 7.3.4.4.3.2-1. | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value as the sequenceNumber in step 3, Table 7.3.4.4.3.2-1. | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideAssistanceData-r9 SEQUENCE { | | | |
| a-gnss-ProvideAssistanceData | The SS provides the assistance data requested by the UE at step 3, Table 7.3.4.4.3.2-1 which are available according to TS 37.571-5 [12]. | | Sub-tests 1-4, 7 |
| otdoa-ProvideAssistanceData | The SS provides the assistance data requested by the UE at step 3, Table 7.3.4.4.3.2 1 which are available according to TS 37.571-5 [12]. | | Sub-tests 5,7 |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.4.3.3-11: LPP Provide Location Information (step 5, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | (0..255) | Contains the same value as the corresponding field in LPP Request Location Information | |

| | | | |
|---|---|---|---|
| | | message in step 2, Table 7.3.4.4.3.1-1 | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | (0..255) | | |
| acknowledgement SEQUENCE { | present, or not present | | |
| ackRequested | TRUE | | |
| ackIndicator | Not present | | |
| } | | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| provideLocationInformation-r9 SEQUENCE { | | | |
| commonIEsProvideLocationInformation | Not present | | |
| a-gnss-ProvideLocationInformation | Present for sub-tests 1-4,7 | | |
| otdoa-ProvideLocationInformation | Present for sub-tests 5,7 | | |
| ecid-ProvideLocationInformation | Not present | | |
| epdu-ProvideLocationInformation | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.4.4.3.3-12: LPP Acknowledgement (step 5a, Table 7.3.4.4.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID | Not present | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present | | |
| acknowledgement SEQUENCE { | | | |
| ackRequested | FALSE | | |
| ackIndicator | (0..255) | Contains the same value of the sequenceNumber field in step 5, Table 7.3.4.4.3.2-1. | |
| } | | | |
| lpp-MessageBody | Not present. | | |
| } | | | |

# 7.3.5 LPP Abort

## 7.3.5.1 E-SMLC initiated Abort

### 7.3.5.1.1 Test Purpose (TP)

(1)

```
with { a NAS signalling connection for EPC-NI-LR session existing }
ensure that {
  when { UE receives a LPP Abort message carrying the transaction ID of an on-going procedure }
    then { UE aborts the on-going procedure }
            }
```

#### 7.3.5.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.355, clause 5.5.3.

[TS 36.355, clause 5.5.3]

Upon receiving an *Abort* message, a device shall:

1> abort any ongoing procedure associated with the transaction ID indicated in the message.

#### 7.3.5.1.3 Test description

##### 7.3.5.1.3.1 Pre-test conditions

System Simulator:

- Cell 1.
- Satellite signals: Not present.

UE:

-

Preamble:

- The UE is in state Generic RB Established (state 3) according to 3GPP TS 36.508 [8].

Related PICS/PIXIT Statements:

-

##### 7.3.5.1.3.2 Test procedure sequence

This test case includes sub-test cases dependent on the positioning method supported by the UE. Each sub-test case is identified by a Sub-Test Case Number as defined below:

| Sub-Test Case Number | Supported Positioning Methods |
|---|---|
| 1 | UE supporting GNSS with A-GPS only |
| 2 | UE supporting GNSS with A-GLONASS only |
| 3 | UE supporting GNSS with A-Galileo only |
| 4 | UE supporting GNSS with A-GPS and A-GLONASS only |
| 5 | UE supporting OTDOA |
| 6 | UE supporting ECID |

**Table 7.3.5.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | The SS sends a LPP message of type Request Location Information including a transaction ID. | <-- | *DLInformationTransfer* (LPP REQUEST LOCATION INFORMATION) | - | - |
| 2 | Immediately after step 2, the SS sends a LPP message of type Abort using the same transaction ID chosen in step 1. | <-- | *DLInformationTransfer* (LPP ABORT) | - | - |
| 3 | The SS waits for 10 seconds to ensure the UE does not send a LPP message of type Provide Location Information with the same transaction ID as in step 1. | | | 1 | P |

7.3.5.1.3.3 Specific message contents

**Table 7.3.5.1.3.3-1: *DLInformationTransfer* (steps 1 and 2, Table 7.3.5.1.3.2-1)**

| Derivation Path: 36.331 clause 6.2.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| DLInformationTransfer ::= SEQUENCE { | | | |
| rrc-TransactionIdentifier | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| dlInformationTransfer-r8 SEQUENCE { | | | |
| dedicatedInfoType CHOICE { | | | |
| dedicatedInfoNAS OCTET STRING | Set according to Table 7.3.5.1.3.3-2 | DOWNLINK GENERIC NAS TRANSPORT | |
| } | | | |
| nonCriticalExtension SEQUENCE {} | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

**Table 7.3.5.1.3.3-2: DOWNLINK GENERIC NAS TRANSPORT (steps 1 and 2, Table 7.3.5.1.3.2-1)**

| Derivation Path: 24.301 Table 8.2.31.1 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Protocol discriminator | 0010 | EPS session management messages | |
| Security header type | 0000 | Plain NAS message | |
| Downlink generic NAS transport message identity | 01101000 | Downlink generic NAS transport | |
| Generic message container type | 00000001 | LTE Positioning Protocol (LPP) message container | |
| Generic message container | **Step 1:** Set according to Table 7.3.5.1.3.3-3 | LPP Request Location Information | |
| | **Step 2:** Set according to Table 7.3.5.1.3.3-4 | LPP Abort | |
| Additional information | Present | Routing Identifier/ Correlation ID | |

**Table 7.3.5.1.3.3-3: LPP Request Locaton Information (step 1, Table 7.3.5.1.3.2-1)**

| Derivation Path: Table 5.4-3 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| As defined in Table 5.4-3 with the following exceptions: | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | 0 | | |
| } | | | |
| locationInformationType | locationEstimateRequired | In case of "UE-based" Location method supported by the UE | |
| | locationMeasurementsRequired | In case of "UE-assisted" Location method supported by the UE | |
| responseTime | 10 | | |

**Table 7.3.5.1.3.3-4: LPP Abort (step 2, Table 7.3.5.1.3.2-1)**

| Derivation Path: 36.355 clause 6.2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| LPP-Message ::= SEQUENCE { | | | |
| transactionID SEQUENCE { | | | |
| initiator | locationServer | | |
| transactionNumber | 0 | | |
| } | | | |
| endTransaction | TRUE | | |
| sequenceNumber | Not present. | | |
| acknowledgement | Not present | | |
| lpp-MessageBody CHOICE { | | | |
| c1 CHOICE { | | | |
| abort SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| abort-r9 SEQUENCE { | | | |
| commonIEsAbort SEQUENCE { | | | |
| abortCause | networkAbort | | |
| } | | | |
| epdu-Abort | Not present | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

# 7.4 Circuit Switched (CS) Fallback

## 7.4.1 MO-LR Procedure

### 7.4.1.1 CS fallback: Network does not support EPC-MO-LR

#### 7.4.1.1.1 Test Purpose (TP)

(1)

```
with { UE in E-UTRA RRC_IDLE state having received an ATTACH ACCEPT message indicating location
       services via EPC not supported and location services via CS domain supported }
ensure that {
  when { UE initiates MO-LR procedure }
    then { UE transmits an EXTENDED SERVICE REQUEST message }
           }
```

#### 7.4.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.272, clause 8.3.1.

[TS 23.272, clause 8.3.1]

MO-LR procedure in the CS fallback in EPS is performed as specified in TS 23.271 [8].

When the MO-LR procedure is triggered by the UE's application, UE will check the LCS Support Indication provided by the Attach and TAU procedures as specified in TS 23.401 [2]:

- If the LCS Support Indication indicates EPC-MO-LR is supported, and if the UE supports EPC-MO-LR, the UE stays in LTE and initiates the EPC-MO-LR procedure.

- If EPC-MO-LR is not supported by either the network or the UE and if the LCS Support Indication indicates CS-MO-LR is supported, and the UE supports CS-MO-LR, the UE assumes CS-MO-LR is provided. Also, if EPC-MO-LR is not supported by either the network or the UE and if network does not provide information on whether CS-MO-LR is supported, then UE assumes CS-MO-LR may be provided. In these cases, if the previous combined EPS/IMSI Attach or Combined TA/LA Update is accepted with no "SMS only" indication, then the UE initiates CS Fallback to perform CS-MO-LR.

NOTE: Based on UE implementation, UE may avoid initiating CS-MO-LR when an IMS VoIP session is active.

- Otherwise, the UE shall not attempt the EPC-MO-LR procedure, i.e. neither EPC-MO-LR nor CS-MO-LR with CS Fallback.

If the UE decided to initiate the CS Fallback for the LCS based on LCS Support Indication check, then, the following is applied:

- When UE is in active mode, UE and the network follows the procedure in clause 6.2 "Mobile Originating Call in Active-Mode". After UE changes its RAT from E-UTRAN to UTRAN/GERAN, it performs CS-MO-LR procedures as specified in TS 23.271 [8].

- When UE is in active mode but there's no need for PS-Handover, then UE and the network follows the procedure in clause 6.3 "Mobile Originating Call in Active Mode - No PS HO Support in GERAN". After UE changes its RAT from E-UTRAN to UTRAN/GERAN, it performs CS-MO-LR procedure as specified in TS 23.271 [8].

- When UE is in idle mode, UE follows the procedure in clause 6.4 "Mobile Originating Call in Idle Mode". After UE changes its RAT from E-UTRAN to UTRAN/GERAN, it performs CS-MO-LR procedure as specified in TS 23.271 [8].

#### 7.4.1.1.3 Test description

##### 7.4.1.1.3.1 Pre-test conditions

System Simulator:

- Cell 1 (E-UTRA) and Cell 5 (UTRA)

UE:

- The UE is configured to initiate combined EPS/IMSI attach.

Preamble:

- The UE is in state Registered, Idle Mode (state 2) on cell 1 according to TS 36.508 [8].

Related PICS/PIXIT Statements:

- Method of triggering a CS-MO-LR request for a location estimate.

7.4.1.1.3.2 Test procedure sequence

**Table 7.4.1.1.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | Cause the UE to initiate MO-LR procedure. | - | - | - | - |
| 2 | The UE transmits an *RRCConnectionRequest* message on Cell 1. | --> | *RRCConnectionRequest* | - | - |
| 3 | The SS transmits an *RRCConnectionSetup* message on Cell 1. | <-- | *RRCConnectionSetup* | - | - |
| 4 | The UE transmits an *RRCConnectionSetupComplete* message on Cell 1.<br>This message includes an EXTENDED SERVICE REQUEST message. | --> | *RRCConnectionSetupComplete* | 1 | P |
| 5 | The SS transmits a *SecurityModeCommand* message on Cell 1. | <-- | *SecurityModeCommand* | - | - |
| 6 | The UE transmits a *SecurityModeComplete* message on Cell 1. | --> | *SecurityModeComplete* | - | - |
| 7 | The SS transmits an *RRCConnectionReconfiguration* message on Cell 1. | <-- | *RRCConnectionReconfiguration* | - | - |
| 8 | The UE transmits an *RRCConnectionReconfigurationComplete* message on Cell 1. | --> | *RRCConnectionReconfigurationComplete* | - | - |
| 9 | The SS transmits an *RRCConnectionRelease* message for redirection to UTRAN carrier on Cell 1. | <-- | *RRCConnectionRelease* | - | - |
| 10-18 | Steps 1 to 6 and steps 10 to 12 of the test procedure in subclause 6.1.2.1 are performed on Cell 5.<br>Note: RRC connection establishment procedure and LCS procedure are performed in UTRAN cell. | - | - | - | - |

7.4.1.1.3.3 Specific message contents

**Table 7.4.1.1.3.3-1: Message ATTACH ACCEPT (preamble, Table 7.4.1.1.3.2-1)**

| Derivation Path: TS 36.571-2 Table 4.3-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Location services indicator in EPC (EPC-LCS) (octet 3, bit 3) | 0 | location services via EPC not supported | |
| Location services indicator in CS (CS-LCS) (octet 3, bit 4 to 5) | 10 | location services via CS domain supported | |

**Table 7.4.1.1.3.3-2: Message *RRCConnectionRelease* (step 9, Table 7.4.1.1.3.2-1)**

| Derivation Path: TS 36.508 Table 4.6.1-15 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| RRCConnectionRelease ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| rrcConnectionRelease-r8 SEQUENCE { | | | |
| redirectedCarrierInfo CHOICE { | | | |
| utra-FDD | Downlink UARFCN of cell 5 | | UTRA-FDD |
| utra-TDD | Downlink UARFCN of cell 5 | | UTRA-TDD |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

| Condition | Explanation |
|---|---|
| UTRA-FDD | UTRA FDD cell environment |
| UTRA-TDD | UTRA TDD cell environment |

## 7.4.1.2 CS fallback: UE does not support EPC-MO-LR

### 7.4.1.2.1 Test Purpose (TP)

(1)

```
with { UE in E-UTRA RRC_IDLE state having received an ATTACH ACCEPT message indicating location
       services via EPC supported and location services via CS domain supported }
ensure that {
  when { UE initiates MO-LR procedure }
    then { UE transmits an EXTENDED SERVICE REQUEST message }
           }
```

### 7.4.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.272, clause 8.3.1.

[TS 23.272, clause 8.3.1]

MO-LR procedure in the CS fallback in EPS is performed as specified in TS 23.271 [8].

When the MO-LR procedure is triggered by the UE's application, UE will check the LCS Support Indication provided by the Attach and TAU procedures as specified in TS 23.401 [2]:

- If the LCS Support Indication indicates EPC-MO-LR is supported, and if the UE supports EPC-MO-LR, the UE stays in LTE and initiates the EPC-MO-LR procedure.

- If EPC-MO-LR is not supported by either the network or the UE and if the LCS Support Indication indicates CS-MO-LR is supported, and the UE supports CS-MO-LR, the UE assumes CS-MO-LR is provided. Also, if EPC-MO-LR is not supported by either the network or the UE and if network does not provide information on whether CS-MO-LR is supported, then UE assumes CS-MO-LR may be provided. In these cases, if the previous combined EPS/IMSI Attach or Combined TA/LA Update is accepted with no "SMS only" indication, then the UE initiates CS Fallback to perform CS-MO-LR.

NOTE: Based on UE implementation, UE may avoid initiating CS-MO-LR when an IMS VoIP session is active.

- Otherwise, the UE shall not attempt the EPC-MO-LR procedure, i.e. neither EPC-MO-LR nor CS-MO-LR with CS Fallback.

If the UE decided to initiate the CS Fallback for the LCS based on LCS Support Indication check, then, the following is applied:

- When UE is in active mode, UE and the network follows the procedure in clause 6.2 "Mobile Originating Call in Active-Mode". After UE changes its RAT from E-UTRAN to UTRAN/GERAN, it performs CS-MO-LR procedures as specified in TS 23.271 [8].

- When UE is in active mode but there's no need for PS-Handover, then UE and the network follows the procedure in clause 6.3 "Mobile Originating Call in Active Mode - No PS HO Support in GERAN". After UE changes its RAT from E-UTRAN to UTRAN/GERAN, it performs CS-MO-LR procedure as specified in TS 23.271 [8].

- When UE is in idle mode, UE follows the procedure in clause 6.4 "Mobile Originating Call in Idle Mode". After UE changes its RAT from E-UTRAN to UTRAN/GERAN, it performs CS-MO-LR procedure as specified in TS 23.271 [8].

#### 7.4.1.2.3 Test description

##### 7.4.1.2.3.1 Pre-test conditions

System Simulator:

- Cell 1 (E-UTRA) and Cell 5 (UTRA)

UE:

- The UE is configured to initiate combined EPS/IMSI attach.

Preamble:

- The UE is in state Registered, Idle Mode (state 2) on cell 1 according to TS 36.508 [8].

Related PICS/PIXIT Statements:

- Method of triggering a CS-MO-LR request for a location estimate.

7.4.1.2.3.2 Test procedure sequence

**Table 7.4.1.2.3.2-1: Main behaviour**

| St | Procedure | Message Sequence | | TP | Verdict |
|---|---|---|---|---|---|
| | | U - S | Message | | |
| 1 | Cause the UE to initiate MO-LR procedure. | - | - | - | - |
| 2 | The UE transmits an *RRCConnectionRequest* message on Cell 1. | --> | *RRCConnectionRequest* | - | - |
| 3 | The SS transmits an *RRCConnectionSetup* message on Cell 1. | <-- | *RRCConnectionSetup* | - | - |
| 4 | The UE transmits an *RRCConnectionSetupComplete* message on Cell 1.<br>This message includes an EXTENDED SERVICE REQUEST message. | --> | *RRCConnectionSetupComplete* | 1 | P |
| 5 | The SS transmits a *SecurityModeCommand* message on Cell 1. | <-- | *SecurityModeCommand* | - | - |
| 6 | The UE transmits a *SecurityModeComplete* message on Cell 1. | --> | *SecurityModeComplete* | - | - |
| 7 | The SS transmits an *RRCConnectionReconfiguration* message on Cell 1. | <-- | *RRCConnectionReconfiguration* | - | - |
| 8 | The UE transmits an *RRCConnectionReconfigurationComplete* message on Cell 1. | --> | *RRCConnectionReconfigurationComplete* | - | - |
| 9 | The SS transmits an *RRCConnectionRelease* message for redirection to UTRAN carrier on Cell 1. | <-- | *RRCConnectionRelease* | - | - |
| 10-18 | Steps 1 to 6 and steps 10 to 12 of the test procedure in subclause 6.1.2.1 are performed on Cell 5.<br>Note: RRC connection establishment procedure and LCS procedure are performed in UTRAN cell. | - | - | - | - |

7.4.1.2.3.3 Specific message contents

**Table 7.4.1.2.3.3-1: Message ATTACH ACCEPT (preamble, Table 7.4.1.2.3.2-1)**

| Derivation Path: TS 36.571-2 Table 4.3-2 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Location services indicator in CS (CS-LCS) (octet 3, bit 4 to 5) | 10 | location services via CS domain supported | |

**Table 7.4.1.2.3.3-2: Message *RRCConnectionRelease* (step 9, Table 7.4.1.2.3.2-1)**

| Derivation Path: TS 36.508 Table 4.6.1-15 | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| RRCConnectionRelease ::= SEQUENCE { | | | |
| criticalExtensions CHOICE { | | | |
| c1 CHOICE { | | | |
| rrcConnectionRelease-r8 SEQUENCE { | | | |
| redirectedCarrierInfo CHOICE { | | | |
| utra-FDD | Downlink UARFCN of cell 5 | | UTRA-FDD |
| utra-TDD | Downlink UARFCN of cell 5 | | UTRA-TDD |
| } | | | |
| } | | | |
| } | | | |
| } | | | |
| } | | | |

| Condition | Explanation |
|---|---|
| UTRA-FDD | UTRA FDD cell environment |
| UTRA-TDD | UTRA TDD cell environment |

# Annex A (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 36.571-2 | | | | | | | |
| 2010-08 | R5#48 | R5-104119 | | | Initial skeleton proposal | | 0.0.0 |
| | R5#48 | R5-104741 | | | Merge of documents R5-104119, R5-104120, R5-104121, R5-104122, together with small editorial modifications | 0.0.0 | 0.0.1 |
| 2011-02 | R5#50 | R5-110250 | | | Various corrections based on LPP v9.3.0 (R5-106431) | 0.0.1 | |
| | | | | | New test cases: LPP Reliable Transport (R5-106433) | | |
| | | | | | New test cases: CS fallback (R5-106698) | | 0.1.0 |
| 2011-05 | R5#51 | R5-112388 | | | Various corrections (R5-110251) | 0.1.0 | |
| | | | | | OTDOA default conditions (R5-110252) | | 0.2.0 |
| 2011-08 | R5#52 | R5-113770 | | | Small corrections to 36.571-2 baseline text | 0.2.0 | |
| | | R5-113771 | | | Addition of LPP abort test case | | |
| | | R5-113147 | | | Addition of Position Capability Transfer test case | | |
| | | R5-113140 | | | Addition of Notification test cases | | |
| | | R5-113769 | | | Addition of UE Network Capability test case | | |
| | | R5-113847 | | | Addition of LPP Error handling test cases | | 1.0.0 |
| 37.571-2 | | | | | | | |
| 2011-11 | R5#53 | R5-115249 | | | Creation of 37.571-2 based on 36.571-2 v1.0.0 and 34.123-1 v9.6.0 | | 1.0.0 |
| | | R5-115250 | | | Default conditions for ECID signaling test cases in 37.571-2 baseline text | | |
| | | R5-115251 | | | Various corrections to the 37.571-2 baseline text | | |
| | | R5-115252 | | | Default system information for UTRAN A-GNSS tests in 37.571-2 baseline text | | 2.0.0 |
| 2011-12 | RAN#54 | - | - | - | Moved to Rel-9 with editorial changes only. | 2.0.0 | 9.0.0 |
| 2012-03 | RAN#55 | R5-120358 | 0001 | - | Addition of missing test case 7.3.4.1 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120359 | 0002 | - | Addition of missing test case 7.3.4.2 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120360 | 0003 | - | Addition of missing test case 7.3.4.3 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120361 | 0004 | - | Addition of missing test case 7.3.4.4 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120362 | 0005 | - | Editorial corrections to 37.571-2 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120363 | 0006 | - | Completion of Test Case 7.3.1.1 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120364 | 0007 | - | Removal of FFS for Sub-test -7 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120395 | 0008 | - | Addition of RESET command to EPC MO-LR tests | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120725 | 0009 | - | Correction of MO-LR CS fallback test cases 7.4.1 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120358 | 0001 | - | Addition of missing test case 7.3.4.1 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120359 | 0002 | - | Addition of missing test case 7.3.4.2 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120360 | 0003 | - | Addition of missing test case 7.3.4.3 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120361 | 0004 | - | Addition of missing test case 7.3.4.4 | 9.0.0 | 9.1.0 |
| 2012-03 | RAN#55 | R5-120362 | 0005 | - | Editorial corrections to 37.571-2 | 9.0.0 | 9.1.0 |
| 2012-06 | RAN#56 | R5-121134 | 0010 | - | Clarification to cell synchronization for OTDOA | 9.1.0 | 9.2.0 |
| 2012-06 | RAN#56 | R5-121148 | 0011 | - | Completion of Test Case 7.3.1.1 | 9.1.0 | 9.2.0 |

# History

| Document history | | |
|---|---|---|
| V9.0.0 | January 2012 | Publication |
| V9.1.0 | March 2012 | Publication |
| V9.2.0 | July 2012 | Publication |
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