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Contents

Foreword

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

The present document defines the contents of LCS assistance data broadcast messages from the Serving Mobile Location Centre (SMLC) and the Mobile Station (MS).

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

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

1 Scope

The present document contains the coding of information necessary for support of location service operation on the mobile radio interface layer 3 between the LMU and SMLC.

Clause 4 defines generic procedures for the control of location services. In clause 5 location service support procedures are defined. Clause 6 gives the functional definitions and contents of messages for location service operations. Clause 7 gives the general format and coding for messages used for location service and the format and coding of information elements used for location service operations. Clause 6 gives the detailed message format and information elements coding between the LMU and SMLC.

Clause 8 gives the specification of the LMU LCS Protocol (LLP) operations. In clause 9 LMU - SMLC messages, data types and identifiers are given.

This version does not support segmentation of messages.

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 44.006: "Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[3] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[4] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol".

[5] 3GPP TS 43.059: "Functional Stage 2 Description of Location Services (LCS) in GERAN".

[6] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[7] ITU-T Recommendation X.691 (1997) | ISO/IEC 8825-2 (1998): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

[8] ITU-T Recommendation X.690 (1997) | ISO/IEC 8825-1 (1998): "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

[9] ITU-T Recommendation X.680 (1997) | ISO/IEC 8824-1 (1998): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[10] ITU-T Recommendation Q.773: "Transaction capabilities formats and encoding".

[11] (void)

[12] 3GPP TS 44.004: "Layer 1; General requirements".

[13] 3GPP TS 44.005: "Data Link (DL) layer General aspects".

[14] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 3".

[15] 3GPP TS 45.002: "Multiplexing and Multiple Access on the Radio Path".

[16] 3GPP TS 52.071: "Location Services (LCS); Location services management".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

E-OTD Assistance Data Message: contains the RTD and BTS coordinates of the neighbours that should be used in E-OTD measurements. This E-OTD Assistance Data is broadcasted using CBCH channel using SMSCB DRX service. The reception of this broadcast message enables MS to calculate its own location.

GPS Assistance Data Message: contains GPS differential corrections. The reception of this broadcast message enables MS to have calculate more accurate location estimate.

GANSS Assistance Data Message: contains GANSS differential corrections. The reception of this broadcast message enables MS to have calculate more accurate location estimate.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 and 3GPP TS 43.059.

4 Generic procedures for the control of location services

4.1 Overview of the generic protocol and its scope

One generic protocol is defined for the control of location services at the radio interface. This protocol operates at layer 3 of the radio interface and assumes the use of layers 1 and 2 conform to 3GPP TS 45-series and 3GPP TS 44.004, 3GPP TS 44.005 and 3GPP TS 44.006. The generic protocol uses the acknowledged information transfer service available at the layer 2 - layer 3 interface.

The Functional protocol is based on the use of the Facility information element and the FACILITY message as well as other specific functional messages specified in the present document.

4.2 Functional procedures for the control of location services

4.2.1 General

This subclause specifies the functional signalling procedures for the control of location services at the radio interface.

The functional protocol utilizes functions and services defined in 3GPP TS 24.008, 3GPP TS 44.018 and the functions of the data link layer as defined in 3GPP TS 44.006. This protocol utilizes also definitions in 3GPP TS 24.007.

The Common Information Element Category utilizes the Facility information element to transport the protocol defined in the present document. The use of the Facility information element is common to many services, and its contents indicates what type of procedure is being requested. This category can be signalled both in the LMU to network and the network to LMU directions.

The correlation of location service operations and their responses, is provided by the combination of the transaction identifier of the messages containing the Facility information element and the Invoke identifier present within the Facility information element itself.

4.2.2 Common Information Element Category

The Common Information Element Category uses operations defined in the present document for location services signalling. Procedures are initiated by sending an operation including an invoke component. The invoke component may yield a Return Error, Return Result or Reject component (also included in an operation) depending on the outcome of the procedure.

The operation state machines, and procedures for management of Invoke IDs specified in ITU-T Recommendation Q.774 White Book are used.

A REGISTER message, a FACILITY message or RELEASE COMPLETE message is used to carry the Facility information element which includes these operations. These operations request, acknowledge or reject the desired location service procedure.

4.2.3 Location service procedures

4.2.3.1 Introduction

For location service procedures independent of any call, the initiating side must establish a MM-connection between the network and the LMU according to the rules given in 3GPP TS 24.007 and 3GPP TS 24.008. The LMU or the network starts the transaction by transferring a REGISTER message across the radio interface. This transaction is identified by the transaction identifier associated with the REGISTER message present in the component part of the Facility information element. Following the REGISTER message one or more FACILITY messages may be transmitted, all of them related by the use of the same transaction identifier. If the transaction is no longer used, it shall be released by sending a RELEASE COMPLETE message. This procedure is specified in detail in clause 5, and the text in clause 5 takes precedence over this introduction.

To convey the location service invocation, the Facility information element is used. The Facility information element present either in the REGISTER message or a subsequent message identifies the location service involved and the type of component (i.e. Invoke, Return result, Return error or Reject component).

When the REGISTER or FACILITY message contains a Facility information element and the requested service is available, a FACILITY message containing a Facility information element may be returned. One or more exchanges of FACILITY messages may subsequently occur. To terminate the service interaction and release the transaction identifier value, a RELEASE COMPLETE message is sent as specified for the specific location service procedure. The RELEASE COMPLETE message may also contain the Facility information element.

4.2.3.2 Handling of protocol errors in LCS procedures

Messages containing a Facility information element shall be checked for protocol errors before the contents of the Facility IE is acted on. The checks shall be performed in the following order:

1) The message carrying the Facility IE shall be checked for protocol errors as specified in subclause 5.7. If a protocol error is found then the procedures in subclause 5.7 apply.

2) The contents of the Facility IE shall be checked for protocol errors as specified in subclause 4.2.6. If a protocol error is found then the procedures in subclause 4.2.6 apply.

4.2.3.3 Handling of other errors in LCS procedures

If the tests specified in subclause 4.2.3.2 have been passed without the detection of a protocol error, the receiver will attempt to process the contents of the Facility Information Element. If errors occur during this processing (e.g. system failure, or information in the Facility IE is incompatible with the requested operation) then the procedures specified in the individual service specifications apply.

An example of the behaviour that could occur in this case is:

- the LMU or network sends a Facility information element containing a return error component in a FACILITY or RELEASE COMPLETE message. If the FACILITY message is used then the MM Connection may continue to be used for further signalling.

4.2.4 Multiple location service invocations

It is possible for several LCS transactions to be used simultaneously. LCS transactions can also exist in parallel with other CM-Layer and MM transactions. The handling of multiple MM connections is defined in 3GPP TS 24.007 and 3GPP TS 24.008.

A single Facility Information Element shall not contain more than one component.

4.2.5 Recovery procedures

In case a transaction is not terminated according to the normal procedure as described in the present document the network side has to ensure that the transaction is terminated e.g. by a supervision timer.

4.2.6 Generic protocol error handling for the component part of location services operations

If a location service operation is to be rejected the operation will be denied, and provided the transaction is still in progress, an appropriate reject component will be returned in a Facility Information Element.

4.2.6.1 Single component errors

The reject component shall be sent in a RELEASE COMPLETE message.

If the component containing the error was itself sent in a RELEASE COMPLETE message then the contents of the component shall be ignored, and no reject component is sent.

4.2.6.2 Multiple component errors

If a single Facility IE contains more than one component then a RELEASE COMPLETE message with the cause "Facility rejected" and without any component shall be sent.

5 Location service support procedures

5.1 General

This clause describes the location service support procedures at the radio interface. These procedures are provided by the location service support entity defined in 3GPP TS 24.007. The location service support procedures provide the means to transfer messages for the location service procedures. These procedures are regarded as the user of the location service support.

5.2 Location service support establishment

At the beginning of each location service procedure a location service support must be established.

5.2.1 Location service support establishment at the originating side

If the entity that uses the location support procedures needs to send a REGISTER message, the location service support entity shall first request the establishment of an MM-connection. This MM-connection is established according to 3GPP TS 24.008 and 3GPP TS 24.007. If the network is the initiating side then MM-connection establishment may involve paging the LMU.

The location service support entity shall send the REGISTER message as the first CM-message on the MM-connection. The REGISTER message is sent to the corresponding peer entity on the MM-connection and the location service support shall be regarded as being established.

5.2.2 Location service support establishment at the terminating side

At the terminating side a location service support is regarded as being established when an MM-connection is established. According 3GPP TS 24.008 this can be ascertained by the receipt of the first message, with a new transaction identifier. For successful establishment of location service support this message shall be a REGISTER message.

If the terminating side needs to reject the establishment of location services support then it may be immediately initiate location services support release (see subclause 5.4).

5.3 Location service support information transfer phase

After the establishment of the location service support both users may exchange FACILITY messages by use of the location service support.

5.4 Location service support release

At the end of each location service procedure the established location service support is released, if a permanent connection is not used.

The side closing the transaction shall release the transaction by sending the RELEASE COMPLETE message to its corresponding peer entity.

Both location service support entities release the MM-connection locally.

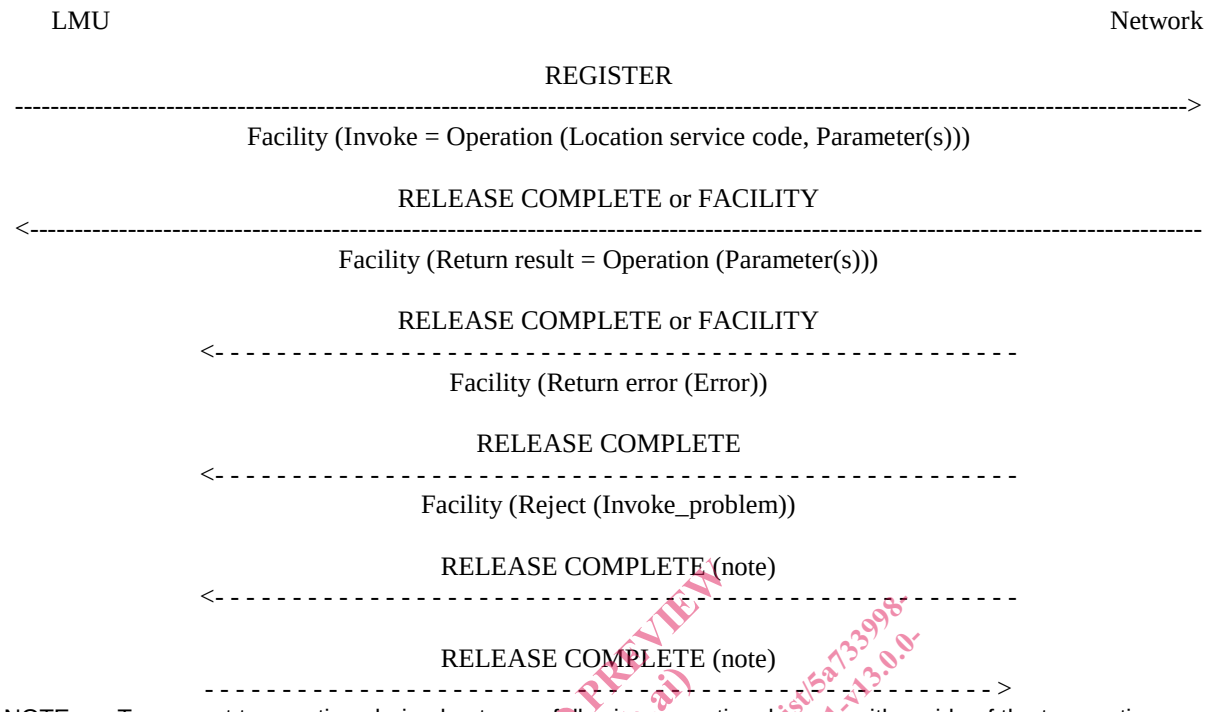
5.5 Recovery procedures

The location service support does not provide recovery procedures, i.e. the operations are transparent to the location service support.

5.6 Message flow (single operation example)

This subclause contains examples of message flows for a single transaction consisting of a single operation. These examples may not show all possibilities.

5.6.1 LMU initiated location service transaction



NOTE: To prevent transactions being kept open following exceptional cases, either side of the transaction may release it by sending a RELEASE COMPETE message without a Facility IE.

Figure 5.6.1: LMU initiated location service transaction