ETSI TS 129 120 V12.0.0 (2014-10)

TECHNICAL SPECIFICATION

Universal Mobile Telecommunications System (UMTS);
LTE;
Mobile Application Part (MAP)
specification for Gateway Location Register (GLR)
(3GPP TS 29.120 version 12.0.0 Release 12)

Reference
RTS/TSGC-0429120vc00

Keywords
LTE,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Contents

Foreword

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

The present document specifies the signalling requirements and procedures used at network elements related to the Gateway Location Register (GLR) for Mobile Application Part (MAP) within the 3GPP system. (i.e. the present document specifies the delta against 3GPP TS 29.002.)

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

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where:

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

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1 Scope

The present document describes the signalling requirements and procedures used at network elements related to the GLR for MAP within the 3GPP system at the application level.

The present document gives the description of the systems needed only in the network utilising GLR as the delta document against 3GPP TS 29.002.

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.

[1] 3GPP TS 23.003: "Numbering, addressing and identification".

[2] 3GPP TS 23.007: "Restoration procedures".

[3] 3GPP TS 23.012: "Location registration procedures".

[4] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) Point to Point (PP)".

[5] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[6] 3GPP TS 23.119: "Gateway Location Register (GLR) - stage2".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CCBS	Completion of Call to Busy Subscriber
GLR	Gateway Location Register
GPRS	General Packet Radio Service
IM_GSN	Intermediate GSN
IM_MSC	Intermediate MSC
SGSN	Serving GPRS support node
GGSN	Gateway GPRS support node

4 The entities and interfaces within the mobile network utilising the GLR

4.1 The entities of the mobile system

The functional entities related to the GLR are described below. The description of each entity is detailed in 3GPP TS 23.119 (GLR stage2 specification). The other functional entities described in the present document (e.g. MSC, VLR, and HLR) are specified in 3GPP TS 29.002.

- The Gateway location Register (GLR).
- The Intermediate MSC (IM-MSC).
- The Intermediate GSN (IM-GSN).

4.2 The Interfaces within the mobile services

The Interfaces related to the GLR are described below. The description of each interface is detailed in 3GPP TS 23.119 (GLR stage2 specification).

- Interface between the HLR and the GLR.
- Interface between the VLR and the GLR.
- Interface between the MSC and the IM_MSC.
- Interface between the SGSN and the GLR.
- Interface between the MSC and the GLR.
- Interface between the GLR and the IM_GSN.

5 Overload and compatibility overview

5.1 Overload control for MAP entities

The VLR and SGSN see the GLR as an HLR, and the HLR sees the GLR as a VLR or a SGSN. Therefore the GLR shall behave like mobile entity as which the GLR is regarded. If overload of the GLR is detected, the responder may ignore requests for certain MAP operations (see tables 5.1/1, 5.1/2 and 5.1/3 in 3GPP TS 29.002). The decision as to which MAP Operations may be ignored is made by the MAP service provider and is based upon the priority of the application context.

5.2 Compatibility

A version negotiation mechanism based on the use of an application-context-name is used to negotiate the protocol version used between two entities for supporting a MAP-user signalling procedure. The description of the version negotiation mechanism is detailed in 3GPP TS 29.002.

6 Requirements concerning the use of SCCP and TC

6.1 Use of SCCP

The Mobile Application Part makes use of the services offered by the Signalling Connection Control Part of signalling System No. 7. CCITT Blue Book or ITU-T (03/93) Recommendations Q.711 to Q.716 should be consulted for the full specification of SCCP. In North America (World Zone 1) the national version of SCCP is used as specified in ANSI T1.112.

6.1.1 SCCP Class

MAP will only make use of the connectionless classes (0 or 1) of the SCCP.

6.1.2 Sub-System Number (SSN)

The Application Entities (AEs) defined for MAP consist of several Application Service Elements (ASEs) and are addressed by sub-system numbers (SSNs). The SSN for MAP are specified in 3GPP TS 23.003 [1]. The specific SSN is not needed for the GLR, IM_MSC, and IM_GSN.

6.1.3 SCCP addressing

6.1.3.1 Introduction

The format and coding of address parameters carried by SCCP are detailed in 3GPP TS 29.002.

The following subclauses describe the method of SCCP addressing appropriate for each entity both for the simple intra-PLMN case and where an inter-PLMN communication is required. The following entities are considered for the GLR additionally:

- the Gateway location Register (GLR);
- the Intermediate Mobile-services Switching Centre (IM_MSC);
- the Intermediate GPRS Support Node (IM_GSN).

6.1.3.2 The Gateway Location Register (GLR)

6.1.3.2.1 Addressed by the VLR

In the network utilising the GLR, when an MS that belongs to other PLMN registers in a VLR/SGSN, the VLR/SGSN sees the GLR as the MS's HLR. When initiating the update location dialogues, the VLR is able to address the GLR based on the SPC of the GLR because of intra-PLMN signalling. And the VLR can address the GLR based on an E.214 Mobile Global Title originally derived by the VLR from the IMSI (when CCITT or ITU-T SCCP is used), or an E.212 number originally derived from IMSI (when ANSI SCCP is used, an IMSI). When answering with Global Title to the VLR, the GLR shall insert its E.164 address in the Calling Party Address of the SCCP message containing the first responding CONTINUE message. After that, the VLR can address the GLR based on an E.164 GLR address.

6.1.3.2.2 Addressed by the HLR

When a location updating dialogue initiated by a GLR has been successfully completed, the HLR sees the GLR as the VLR. When initiating dialogues towards the VLR, the routeing information used by the HLR is derived from the E.164 VLR number received as a parameter of the MAP message initiating the update location dialogue, but in reality the HLR addresses the GLR using the VLR number.

6.1.3.2.3 Addressed by the GMSC

In the case that the MS is served by the SGSN in the network utilising the GLR, the GMSC sees the GLR as the SGSN. When the GMSC initiates dialogues towards the SGSN the SGSN (MAP) SSN (See 3GPP TS 23.003) shall be included in the called party address. The routeing information used by the GMSC is derived from the E.164 SGSN number received as a parameter of the MAP message initiating the forward short message procedure. But in reality the GMSC addresses the GLR using the SGSN number.

6.1.3.2.4 Addressed by the IM-GSN

In the network utilising the GLR, the IM-GSN initiates the GPRS location information retrieval to the GLR. The IM-GSN must have the value of the GLR address beforehand.

6.1.3.3 The Intermediate MSC (IM_MSC)

6.1.3.3.1 Addressed by the GMSC

When a short message for CS has to be routed to an MS, the GMSC addresses the MSC by an MSC identity received from the HLR that complies with E.164 rules. But in reality the GMSC addresses the IM-MSC in the network utilising the GLR.

6.1.3.3.2 Addressed by the GMLC

When a location request for a particular MS needs to be sent to the MS's VMSC, the GMLC addresses the MSC using an E.164 address received from the MS's HLR. But in reality the GMLC addresses the IM-MSC in the network utilising the GLR.

6.1.3.4 The Intermediate GSN (IM_GSN)

The IM-GSN provides routing of the Network-Requested PDP Context activation. If a Network-Requested PDP Context activation fails, the GLR will alert the IM-GSN when the subscriber becomes reachable. The GLR will use the E.164 IM-GSN number received as parameter of the MAP message reporting the failure.

6.1.3.5 Summary table

The following table summarises the SCCP address used for invoke operations. As a principle, within a PLMN either an SPC or a GT may be used (network operation option), whereas when addressing an entity outside the PLMN the GT must be used. The address type mentioned in the table (e.g. MSISDN) is used as GT or to derive the SPC.

For a response, the originating address passed in the invoke message is used as SCCP Called Party Address. For extra-PLMN addressing the own E.164 entity address is used as SCCP Calling Party Address; for intra-PLMN addressing an SPC derived from the entity number may be used instead. When using an SPC, the SPC may be taken directly from MTP.

Table 6.1.3/1

to from	fixed net work	HLR	VLR	MSC	SGSN	GGSN	GLR	IM-MSC	IM-GSN
fixed network									
home location register							I:SPC/GT E:GT T:VLR NUMBER		
visitor location register							I:SPC/GT E:GT T:MGT (outside World Zone 1)/MSISDN (World Zone 1/)HLR NUMBER (note)		
mobile-services switching centre							E:GT T:SGSN NUMBER	I:SPC/GT E:GT T:MSC NUMBER	
Serving GPRS Support Node							I:SPC/GT T:MGT/MSISDN/HLR NUMBER		
Gateway GPRS Support Node						Note1			
Gateway Location register	---	E:GT T:MGT (outside World Zone1)/MSISDN(World Zone1/)HLR NUMBER (note)	I:SPC/GT T:VLR NUMBER	---	I:SPC/GT T:SGSN NUMBER				
Intermediate-MSC	---			I:SPC/GT T:MSC NUMBER					
Intermediate-GSN	---						I:SPC/GT T:HLR NUMBER		

I: Intra-PLMN E: Extra (Inter)-PLMN T: Address Type
GT: Global Title MGT: E.214 Mobile Global Title SPC: Signalling Point Code

NOTE 0: For initiating the location updating procedure and an authentication information retrieval from the HLR preceding it, the VLR has to derive the HLR address from the IMSI of the MS. The result can be an SPC or an E.214 Mobile Global Title if CCITT or ITU-T SCCP is used, or IMSI itself if ANSI SCCP is used (ANSI SCCP is used in World Zone 1). When continuing the established update location dialogue (as with any other dialogue) the VLR must derive the routeing information towards the HLR from the Calling Party Address received with the first responding CONTINUE message until the dialogue terminating message is received.
For transactions invoked by the VLR after update location completion, the VLR may derive the information for addressing the HLR from addresses received in the course of the update location procedure (MSISDN or HLR number) or from the IMSI.
When invoking the Restore Data procedure and an authentication information retrieval from the HLR preceding it, the VLR must derive the information for addressing the HLR from the address information received in association with the roaming number request. This may be either the IMSI received as a parameter of the MAP message requesting the Roaming Number or the Calling Party Address associated with the MAP message requesting the Roaming Number.
From VLR in, GLR as for T (address type) only HLR Number is used. VLR and HLR are because only the thing that is belonging to same PLMN is thought.

NOTE1: The hatching part is the same part of 3GPP TS29.002.

6.2 Use of TC

Refer to the corresponding section in 3GPP TS 29.002.