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Diameter-based SLh interface for Control Plane LCS
(3GPP TS 29.173 version 11.1.0 Release 11)**

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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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1 Scope

The present document describes the Diameter-based SLh interface between the GMLC and the HSS defined for the Control Plane LCS in EPC.

LCS procedures over the SLh interface are defined in the 3GPP TS 23.271 [2].

This specification defines the Diameter application for the GMLC-HSS, SLh reference point. The interactions between the HSS and the GMLC are specified, including the signalling flows. As LCS procedures over the Diameter-based SLh interface are identical to the MAP-based Lh interface, the descriptions of the Lh MAP operations defined in the 3GPP TS 29.002 [3] are mapped into the descriptions of the SLh Diameter commands.

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 29.002: "Mobile Application Part (MAP) specification".

[4] 3GPP TS 29.228: "IP multimedia (IM) Subsystem Cx Interface; Signalling flows and Message Elements".

[5] IETF RFC 3588: "Diameter Base Protocol".

[6] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".

[7] IETF RFC 4960: "Stream Control Transport Protocol".

[8] 3GPP TS 29.229: "Cx and Dx Interfaces based on the Diameter protocol; protocol details".

[9] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol; protocol details".

[10] 3GPP TS 23.003: "Numbering, addressing and identification ".

[11] 3GPP TS 23.012: "Location Management Procedures".

[12] 3GPP TS 29.272: "Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".

[13] IETF RFC 2234: "Augmented BNF for syntax specifications".

[14] 3GPP TS 29.234: "3GPP system to Wireless Local Area Network (WLAN) Interworking; Stage 3".

[15] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1], 3GPP TS 23.271 [2] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

ABNF	Augmented Backus-Naur form
AVP	Attribute Value Pair
H-GMLC	Home-Gateway Mobile Location Centre
IANA	Internet Assigned Numbers Authority
PMD	Pseudonym mediation device functionality
PPR	Privacy Profile Register
R-GMLC	Requesting-Gateway Mobile Location Centre
RFC	Request For Comments
V-GMLC	Visited-Gateway Mobile Location Centre

4 General Description

4.1 Introduction

The SLh reference point between the GMLC and the HSS is defined in the 3GPP TS 23.271 [2].

This document describes the Diameter-based SLh interface related procedures, message parameters and protocol specifications.

4.2 Architecture Overview

The architecture for support of Location Services in GSM, UMTS and EPS has been defined in 3GPP TS 23.271 [2] and the relevant network elements and interfaces are shown in the figure 4.2-1.

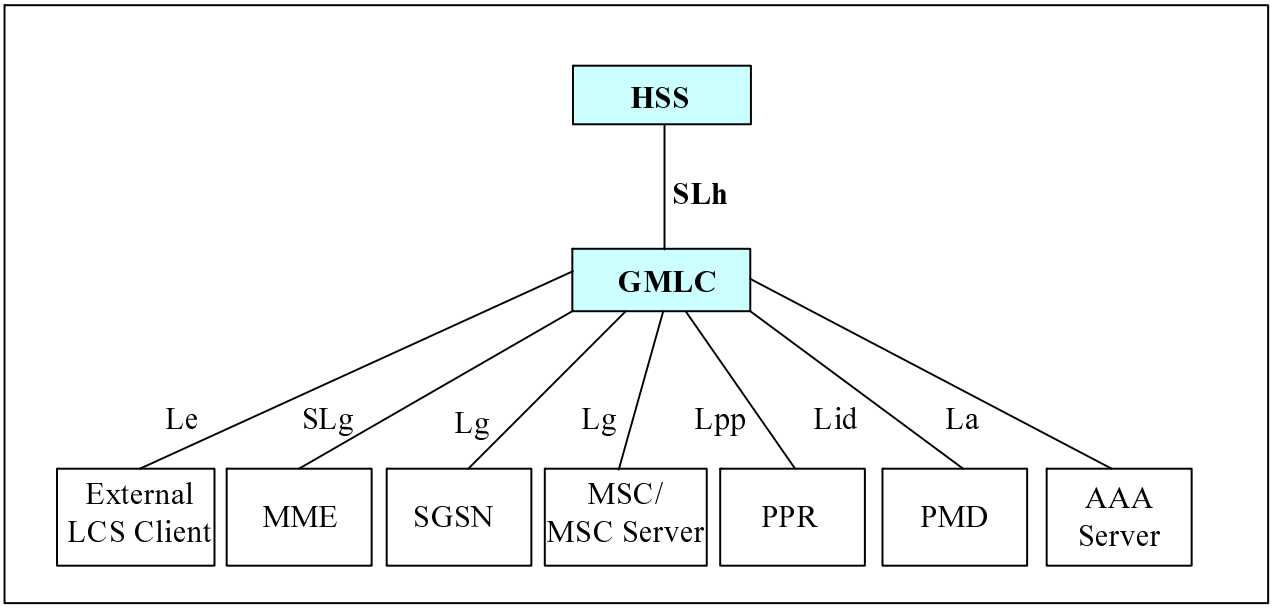

Figure 4.2-1: Overview of the LCS Functional Architecture

In this architecture, the SLh interface is defined between the Gateway Mobile Location Center (GMLC) and the Home Subscriber Server (HSS) to allow the GMLC to request routing information from the HLR or HSS.

4.3 Functional Requirements of SLh Interface

The requirements for SLh interface are defined in 3GPP TS 23.271 [2].

The SLh interface is used by the GMLC to request routing information from the HSS i.e. the address of the H-GMLC, and/or the address of the visited MSC/MSC server, SGSN, 3GPP AAA server or MME for a particular target UE whose location has been requested.

5 Diameter-based SLh Interface

5.1 Introduction

This section describes the Diameter-based SLh interface related procedures and Information elements exchanged between functional entities.

In the tables that describe the Information Elements transported by each Diameter command, each Information Element is marked as (M) Mandatory, (C) Conditional or (O) Optional in the "Cat." column. For the correct handling of the Information Element according to the category type, see the description detailed in section 6 of the 3GPP TS 29.228 [4].

5.2 Procedure Descriptions

5.2.1 Send Routing Information for LCS

5.2.1.1 General

This procedure is used between the GMLC and the HSS. The procedure is invoked by the GMLC and is used:

- To retrieve routing information for LCS for a specified user from the HSS.

This procedure is mapped to the commands LCS-Routing-Info-Request/Answer in the Diameter application specified in chapter 6. Tables 5.2.1.1/1 and 5.2.1.1/2 detail the involved information elements.

Table 5.2.1.1/1: Send Routing Information for LCS (SLh-LCS-SRI)

Information element name	Mapping to Diameter AVP	Cat.	Description
IMSI	User-Name	C	This information element shall contain the IMSI of the targeted user. This IE shall be present if the MSISDN is absent.
MSISDN	MSISDN	C	This information element shall contain the MSISDN of the targeted user. This IE shall be present if the IMSI is absent.
GMLC Number	GMLC-Number	O	This information element shall contain the ISDN (E.164) number of the requesting GMLC.
Supported Features (See 3GPP TS 29.229 [8])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.

Table 5.2.1.1/2: Send Routing Information for LCS (SLh-LCS-SRI) Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 5.3.5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for SLh errors. This is a grouped AVP which contains the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP.
IMSI	User-Name	C	This information element shall contain the IMSI of the targeted user. This IE shall be present if the MSISDN is absent.
MSISDN	MSISDN	C	This information element shall contain the MSISDN of the targeted user. This IE shall be present if the IMSI is absent.
LMSI	LMSI	C	This information element shall contain the LMSI allocated by the VLR. If available in the HSS, this IE shall be present only when the Result- Code is DIAMETER_SUCCESS and the serving node is a VLR.
Serving Node	Serving-Node	C	This information element shall contain the information about the network node serving the targeted user i.e. the name/number of the serving node (MME, SGSN, 3GPP AAA server or MSC/MSC server), the LCS capabilities sets supported by the serving node and the IP address of the visited GMLC associated with the serving node. This IE shall be present only when the Result- Code is DIAMETER_SUCCESS.
Additional Serving Node	Additional-Serving-Node	C	This information element shall contain the information about another network node serving the targeted user. This IE shall be present only when the Result- Code is DIAMETER_SUCCESS. There may be multiple instances of this IE in the response provided by the HSS.
Home GMLC Address	GMLC-Address	C	This information element shall contain the IP address of the H-GMLC. This IE shall be present only when the Result-Code is DIAMETER_SUCCESS.
PPR Address	PPR-Address	C	This information element shall contain the IP address of the Privacy Profile Register (PPR). If available in the HSS, this IE shall be present only when the Result-Code is DIAMETER_SUCCESS.
Supported Features (See 3GPP TS 29.229 [8])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.

5.2.1.2 Detailed Behaviour of the HSS

Upon reception of the Send Routing Info for LCS request, the HSS shall, in the following order:

1. Check whether the requesting GMLC belongs to a network authorized to request UE location information. If not, Experimental-Result shall be set to DIAMETER_ERROR_UNAUTHORIZED_REQUESTING_NETWORK in the Send Routing Information for LCS Response.

2. Check that the User Identity for whom data is asked exists in HSS. If not, Experimental-Result shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Send Routing Information for LCS Response.

3. Check that there is serving node associated with the targeted user. If not, Experimental-Result shall be set to DIAMETER_ERROR_ABSENT_USER in the Send Routing Information for LCS Response.

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [9] and 3GPP TS 29.229 [8] for an explanation of the error codes).

If the HSS cannot fulfil the received request for reasons not stated in the above steps, e.g. due to a database error or empty mandatory data elements, it shall stop processing the request and set Result-Code to DIAMETER_UNABLE_TO_COMPLY.

Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS. The HSS returns one or several of the network addresses of the current MME, SGSN, 3GPP AAA server and/or VMSC/MSC server, the LCS capabilities of the serving nodes if available, the V-GMLC address associated with the serving nodes, if available, and whichever of the IMSI and MSISDN that was not provided in the Send Routing Info for LCS request. The HSS returns the address of the H-GMLC. The HSS also provides the address of the PPR, if available.

Regarding the LCS capabilities of the serving nodes, if the HSS registered an SGSN via the S6d reference point (i.e., the registered serving node is an S4-SGSN), the HSS shall set the LCS-Capabilities-Set value to indicate support of Capability Set 5 (i.e., LCS release 7 or later version). If the HSS registered an MME, the HSS shall not indicate any LCS capability value to the GMLC (i.e., the LCS-Capabilities-Set AVP shall be absent over SLh when the serving node is an MME); in this case, the GMLC shall assume that the MME supports LCS Capability Set 5.

5.2.1.3 Detailed Behaviour of the GLMC

If there are a serving node as well as additional serving nodes in a successful Send Routing Info for LCS response, the receiving shall use the serving node in preference to the additional serving nodes.

6 Protocol Specification and Implementations

6.1 Introduction

6.1.1 Use of Diameter Base Protocol

The Diameter Base Protocol as specified in IETF RFC 3588 [5] shall apply except as modified by the defined support of the methods and the defined support of the commands and AVPs, result and error codes as specified in this specification. Unless otherwise specified, the procedures (including error handling and unrecognised information handling) shall be used unmodified.

6.1.2 Securing Diameter Messages

For secure transport of Diameter messages, see 3GPP TS 33.210 [6].

6.1.3 Accounting Functionality

Accounting functionality (Accounting Session State Machine, related command codes and AVPs) shall not be used on the SLh interface.

6.1.4 Use of Sessions

Between the GMLC and the HSS, Diameter sessions shall be implicitly terminated. An implicitly terminated session is one for which the server does not maintain state information. The client shall not send any re-authorization or session termination requests to the server.

The Diameter base protocol includes the Auth-Session-State AVP as the mechanism for the implementation of implicitly terminated sessions.

The client (server) shall include in its requests (responses) the Auth-Session-State AVP set to the value NO_STATE_MAINTAINED (1), as described in IETF RFC 3588 [5]. As a consequence, the server shall not maintain any state information about this session and the client shall not send any session termination request. Neither the Authorization-Lifetime AVP nor the Session-Timeout AVP shall be present in requests or responses.

6.1.5 Transport Protocol

Diameter messages over the SLh interface shall make use of SCTP IETF RFC 4960 [7] as transport protocol.

6.1.6 Routing Considerations

This clause specifies the use of the Diameter routing AVPs Destination-Realm and Destination-Host.

If GMLC knows the address/name of the HSS for a certain user, both the Destination-Realm AVP and the Destination-Host AVP shall be present in the request. Otherwise, only the Destination-Realm AVP shall be present and the command shall be routed to the next Diameter node. Consequently, the Destination-Host AVP is declared as optional in the ABNF for all requests initiated by a GMLC.

Destination-Realm AVP is declared as mandatory in the ABNF for all requests.

6.1.7 Advertising Application Support

The HSS and GMLC shall advertise support of the Diameter SLh Application by including the value of the application identifier in the Auth-Application-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands.

The vendor identifier value of 3GPP (10415) shall be included in the Supported-Vendor-Id AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands, and in the Vendor-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands.

The Vendor-Id AVP included in Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands that is not included in the Vendor-Specific-Application-Id AVPs as described above shall indicate the manufacturer of the Diameter node as per RFC 3588 [5].

6.1.8 Diameter Application Identifier

The SLh interface protocol shall be defined as an IETF vendor specific Diameter application, where the vendor is 3GPP. The vendor identifier assigned by IANA to 3GPP (http://www.iana.org/assignments/enterprise-numbers) is 10415.

The Diameter application identifier assigned to the SLh interface application is 16777291 (allocated by IANA).

6.1.9 User Identity to HSS resolution

The User identity to HSS resolution mechanism enables the GMLC (for non-roaming case) or Diameter Relay/proxy agents in the home network (for roaming case) to find the identity of the HSS that holds the LCS subscription data and routing information for the target user when multiple and separately addressable HSSs have been deployed in the home network. The resolution mechanism is not required in networks that utilise a single HSS.

This User identity to HSS resolution mechanism may rely on routing capabilities provided by Diameter and be implemented in the home operator network within dedicated Diameter Agents (Redirect Agents or Proxy Agents)

responsible for determining the HSS identity based on the provided user identity. If this Diameter based implementation is selected by the Home network operator, the principles described in the 3GPP TS 29.272 [12] shall apply.

NOTE: Alternatives to the user identity to HSS resolution Diameter based implementation are outside the scope of this specification.

6.2 Commands

6.2.1 Introduction

This section defines the Command code values and related ABNF for each command described in this specification.

6.2.2 Command-Code values

This section defines Command-Code values for the SLh interface application as allocated by IANA.

Every command is defined by means of the ABNF syntax IETF RFC 2234 [13], according to the rules in IETF RFC 3588 [5]. In the case, the definition and use of an AVP is not specified in this document, the guidelines in IETF RFC 3588 [5] shall apply.

NOTE: For this release, the Vendor-Specific-Application-Id AVP is included as an optional AVP in all commands in order to ensure interoperability with diameter agents following a strict implementation of IETF RFC 3588 [5], by which messages not including this AVP will be rejected. IETF RFC 3588 [5] indicates that this AVP shall be present in all proxiable commands, such as those specified here, despite that the contents of this AVP are redundant since the application identifier is already present in the command header. This AVP may be removed in subsequent revisions of this specification, once the diameter base protocol is updated accordingly.

The following Command Codes are defined in this specification:

Table 6.2.2/1: Command-Code values for SLh

Command-Name	Abbreviation	Code	Section
LCS-Routing-Info-Request	RIR	8388622	6.2.3
LCS-Routing-Info-Answer	RIA	8388622	6.2.4

For these commands, the Application-ID field shall be set to 16777291 (application identifier of the SLh interface application, allocated by IANA).

6.2.3 LCS-Routing-Info-Request (RIR) Command

The LCS-Routing-Info-Request (RIR) command, indicated by the Command-Code field set to 8388622 and the "R" bit set in the Command Flags field, is sent from GMLC to HSS.

Message Format

< LCS-Routing-Info-Request> ::= < Diameter Header: 8388622, REQ, PXY, 16777291 >

< Session-Id >

[Vendor-Specific-Application-Id]

{ Auth-Session-State }

{ Origin-Host }

{ Origin-Realm }

[Destination-Host]

{ Destination-Realm }

[User-Name]

[MSISDN]

[GMLC-Number]

*[Supported-Features]

*[Proxy-Info]

*[Route-Record]

*[AVP]

6.2.4 LCS-Routing-Info-Answer (RIA) Command

The LCS-Routing-Info-Answer (RIA) command, indicated by the Command-Code field set to 8388622 and the 'R' bit cleared in the Command Flags field, is sent from HSS to GMLC.

Message Format

< LCS-Routing-Info-Answer> ::= < Diameter Header: 8388622, PXY, 16777291 >

< Session-Id >

[Vendor-Specific-Application-Id]

[Result-Code]

[Experimental-Result]

{ Auth-Session-State }

{ Origin-Host }

{ Origin-Realm }

*[Supported-Features]

[User-Name]

[MSISDN]

[LMSI]

[Serving-Node]

*[Additional-Serving-Node]

[GMLC-Address]

[PPR-Address]

*[AVP]

*[Failed-AVP]

*[Proxy-Info]

*[Route-Record]

6.3 Result-Code AVP and Experimental-Result AVP Values

6.3.1 General

This section defines result code values that shall be supported by all Diameter implementations that conform to this specification.

6.3.2 Success

Result codes that fall within the Success category shall be used to inform a peer that a request has been successfully completed. The Result-Code AVP values defined in Diameter Base Protocol RFC 3588 [5] shall be applied.

6.3.3 Permanent Failures

Errors that fall within the Permanent Failures category shall be used to inform the peer that the request has failed, and should not be attempted again. The Result-Code AVP values defined in Diameter Base Protocol RFC 3588 [5] shall be applied. When one of the result codes defined here is included in a response, it shall be inside an Experimental-Result AVP and the Result-Code AVP shall be absent.

6.3.3.1 DIAMETER_ERROR_USER_UNKNOWN (5001)

This result code shall be sent by the HSS to indicate that the user identified by the IMSI or the MSISDN is unknown. This error code is defined in 3GPP TS 29.229 [8]

6.3.3.2 DIAMETER_ERROR_UNAUTHORIZED_REQUESTING_NETWORK (5490)

This result code shall be sent by the HSS to indicate that the requesting GMLC's network is not authorized to request UE location information.

6.3.4 Transient Failures

Errors that fall within the transient failures category are those used to inform a peer that the request could not be satisfied at the time that it was received. The request may be able to be satisfied in the future.

6.3.4.1 DIAMETER_ERROR_ABSENT_USER (4201)

This result code shall be sent by the HSS to indicate that the location of the targeted user is not known at this time to satisfy the requested operation.

6.4 AVPs

6.4.1 General

The following table specifies the Diameter AVPs defined for the SLh interface protocol, their AVP Code values, types, possible flag values and whether or not the AVP may be encrypted. The Vendor-ID header of all AVPs defined in this specification shall be set to 3GPP (10415).

Table 6.4.1/1: SLh specific Diameter AVPs

				AVP Flag rules				
Attribute Name	**AVP Code**	**Section defined**	**Value Type**	**Must**	**May**	**Should not**	**Must not**	**May Encr.**
LMSI	2400	6.4.2	OctetString	M, V				No
Serving-Node	2401	6.4.3	Grouped	M, V				No
MME-Name	2402	6.4.4	DiameterIdentity	M, V				No
MSC-Number	2403	6.4.5	OctetString	M, V				No
LCS-Capabilities-Sets	2404	6.4.6	Unsigned32	M, V				No
GMLC-Address	2405	6.4.7	Address	M, V				No
Additional-Serving-Node	2406	6.4.8	Grouped	M, V				No
PPR-Address	2407	6.4.9	Address	M, V				No
MME-Realm	2408	6.4.12	DiameterIdentity	V			M	No
NOTE 1: The AVP header bit denoted as "M", indicates whether support of the AVP is required. The AVP header bit denoted as "V", indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see IETF RFC 3588 [5].								

The following table specifies the Diameter AVPs re-used by the SLh interface protocol from existing Diameter Applications, including a reference to their respective specifications and when needed, a short description of their use within SLh.

Any other AVPs from existing Diameter Applications, except for the AVPs from Diameter Base Protocol, do not need to be supported. The AVPs from Diameter Base Protocol are not included in table 6.4.1/2, but they may be re-used for the SLh protocol.

Table 6.4.1/2: SLh re-used Diameter AVPs

Attribute Name	Reference	Comments
MSISDN	3GPP TS 29.329 [9]	
SGSN-Number	3GPP TS 29.272 [12]	
Supported-Features	3GPP TS 29.229 [8]	
Feature-List-ID	3GPP TS 29.229 [8]	See section 6.4.10
Feature-List	3GPP TS 29.229 [8]	See section 6.4.11
GMLC-Number	3GPP TS 29.272 [12]	
3GPP-AAA-Server-Name	3GPP TS 29.234 [14]	

6.4.2 LMSI

The LMSI AVP is of type OctetString and it shall contain the Local Mobile Station Identity (LMSI) allocated by the VLR, as defined in 3GPP TS 23.003 [10]. For further details on the encoding of this AVP, see 3GPP TS 23.003[10].

6.4.3 Serving-Node

The Serving-Node AVP is of type Grouped. This AVP shall contain the information about the network node serving the targeted user.

AVP format

Serving-Node ::=<AVP header: 2401 10415>

[SGSN-Number]

[MME-Name]

[MME-Realm]

[MSC-Number]

[3GPP-AAA-Server-Name]

[LCS-Capabilities-Sets]

[GMLC-Address]

*[AVP]

The GMLC-Address AVP included in the Serving-Node grouped AVP shall contain, if present, the IPv4 or IPv6 address of the GMLC associated with the serving node (i.e., either the home GMLC or the visited GMLC, depending on the location of the serving node).

6.4.4 MME-Name

The MME-Name AVP is of type DiameterIdentity and it shall contain the Diameter identity of the serving MME. For further details on the encoding of this AVP, see IETF RFC 3588 [5].

6.4.5 MSC-Number

The MSC-Number AVP is of type OctetString and it shall contain the ISDN number of the serving MSC or MSC server in international number format as described in ITU-T Rec E.164 [15] and shall be encoded as a TBCD-string. See 3GPP TS 29.002 [3] for encoding of TBCD-strings.

6.4.6 LCS-Capabilities-Sets

The LCS-Capabilities-Sets AVP is of type Unsigned32 and it shall contain a bit mask. The meaning of the bits shall be as defined in 3GPP 29.002 [3].

6.4.7 GMLC-Address

The GMLC-Address AVP is of type Address and shall contain the IPv4 or IPv6 address of H-GMLC or the V-GMLC associated with the serving node.

6.4.8 Additional-Serving-Node

The Additional-Serving-Node AVP is of type Grouped. This AVP shall contain the information about the network node serving the targeted user.

AVP format

Additional-Serving-Node ::= <AVP header: 2406 10415>

[SGSN-Number]

[MME-Name]

[MME-Realm]

[MSC-Number]

[3GPP-AAA-Server-Name]

[LCS-Capabilities-Sets]

[GMLC-Address]

*[AVP]

The GMLC-Address AVP included in the Additional-Serving-Node grouped AVP shall contain, if present, the IPv4 or IPv6 address of the GMLC associated with the serving node (i.e., either the home GMLC or the visited GMLC, depending on the location of the serving node).

6.4.9 PPR-Address

The PPR-Address AVP is of type Address and contains the IPv4 or IPv6 address of the Privacy Profile Register for the targeted user.

6.4.10 Feature-List-ID AVP

The syntax of this AVP is defined in 3GPP TS 29.229 [8]. For this release, the Feature-List-ID AVP value shall be set to 1.

6.4.11 Feature-List AVP

The syntax of this AVP is defined in 3GPP TS 29.229 [8]. A null value indicates that there is no feature used by the application.

NOTE: There is no feature defined for this release.

6.4.12 MME-Realm

The MME-Realm AVP is of type DiameterIdentity and it shall contain the Diameter Realm Identity of the serving MME. For further details on the encoding of this AVP, see IETF RFC 3588 [5].

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2010-03	CT#47	CP-090815			TS presented for approval in CT#47	2.0.0	9.0.0
2010-09	CT#49	CP-100463	0002	1	Application ID and Command code values	9.0.0	9.1.0
2011-03	-	-	-	-	Update to Rel-10 version (MCC)	9.1.0	10.0.0
2011-12	CT#54	CP-11786	0004	2	Identifications of MME in location procedures	10.0.0	10.1.0
2012-03	CT#55	CP-120023	0007	1	MSC-Number format	10.1.0	10.2.0
2012-09	CT#57	CP-120490	0008	1	LCS-Capabilities-Set AVP	10.2.0	10.3.0
2012-09	-	-	-	-	Update to Rel-11 version (MCC)	10.3.0	11.0.0
2012-12	CT#58	CP-120719	0013	1	Clarification on the use of Vendor-Specific-Application-Id AVP	11.0.0	11.1.0

History

Document history		
V11.0.0	October 2012	Publication
V11.1.0	January 2013	Publication