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Universal Mobile Telecommunications System (UMTS);

LTE;

5G;

Diameter based protocols to support

Short Message Service (SMS)

capable Mobile Management Entities (MMEs)

(3GPP TS 29.338 version 17.2.0 Release 17)



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- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

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1 Scope

The present document defines the Diameter-based interfaces specific to SMS when they are used in conjunction with the "SMS in MME" architecture specified in 3GPP TS 23.272 [2] or for SGSN supporting EPS interfaces, or the "SMS in 5GS" architecture specified in 3GPP TS 23.501 [21]. It comprises:

- the Diameter application for the S6c interface between the HSS/UDM and the central SMS functions (SMS-GMSC, SMS Router) ;
- the Diameter application
 - for the SGd interface between the MME/SMSF, the SMS-IWMSC, the SMS-GMSC and the SMS Router.
 - for the Gdd interface between the SGSN, the SMS-IWMSC, the SMS-GMSC and the SMS Router.

For the purpose of supporting SMS in 5GS, the UDM may implement the requirements specified in the present specification for HSS, with the following modification:

- "HSS" is to be replaced with "UDM".

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 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".
- [3] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- [4] 3GPP TS 29.272: "Evolved Packet System (EPS); Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".
- [5] 3GPP TS 29.229: "Cx and Dx interfaces based on the Diameter protocol; Protocol details".
- [6] IETF RFC 2234: "Augmented BNF for Syntax Specifications: ABNF".
- [7] Void.
- [8] IETF RFC 5516: "Diameter Command Code Registration for the Third Generation Partnership Project (3GPP) Evolved Packet System (EPS)".
- [9] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [10] 3GPP TS 29.173: "Location Services (LCS); Diameter-based SLh interface for Control Plane LCS".
- [11] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".
- [12] IETF RFC 4960: "Stream Control Transport Protocol".
- [13] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".
- [14] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol; Protocol details".

- [15] 3GPP TS 29.336: "Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications".
- [16] 3GPP TS 23.003: "Numbering, addressing and identification".
- [17] 3GPP TS 23.204: "Support of Short Message Service (SMS) over generic 3GPP Internet Protocol (IP) access; Stage 2".
- [18] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".
- [19] IETF RFC 7944: "Diameter Routing Message Priority".
- [20] IETF RFC 6733: "Diameter Base Protocol".
- [21] 3GPP TS 23.501: "System Architecture for the 5G System".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

ABNF	Augmented Backus-Naur Form
DRMP	Diameter Routing Message Priority
DSCP	Differentiated Services Code Point
IANA	Internet Assigned Numbers Authority
IP-SM-GW	IP Short Message Gateway
MWD	Message Waiting Data
RP	Relay layer Protocol
RP-MTI	RP Message Type Indicator
RP-SMEA	RP SME-Address
RP-UI	RP User Information
SM RL	Short Message Relay Layer
SMS-GMSC	Gateway MSC for SMS
SMS-IWMSC	Interworking MSC for SMS
SMSMI	SMS without MSISDN in IMS

4 General

4.1 Introduction

The SMS in MME architecture is described in 3GPP TS 23.272 [2] and the SMS in 5GS architecture is described in 3GPP TS 23.501 [21], have specified the reference points S6c and SGd.

The clause 4 addresses Diameter aspects which are common to S6c, SGd and Gdd.

4.2 Use of Diameter Base protocol

The Diameter base protocol as specified in IETF RFC 6733 [20] 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.

4.3 Securing Diameter messages

For secure transport of Diameter messages, see 3GPP TS 33.210 [11].

4.4 Accounting functionality

Accounting functionality (Accounting Session State Machine, related command codes and AVPs) shall not be used on the S6c, SGd and Gdd interfaces.

4.5 Use of sessions

Diameter sessions shall be implicitly terminated over the S6c, SGd and Gdd interfaces. 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 specified in IETF RFC 6733 [20] 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 6733 [20]. 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.

4.6 Transport protocol

Diameter messages over the S6c, SGd and Gdd interfaces shall make use of SCTP as specified in IETF RFC 4960 [12] as transport protocol.

4.7 Advertising application support

The MME, HSS, SMS-IW MSC, SMS-GMSC and SMS Router shall advertise support of the Diameter S6c Application over the S6c interface and of the Diameter SGd Application over the SGd interface 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 MME, SMS-GMSC and SMS Router shall additionally advertise support of the Diameter S6c Application over the SGd interface if they support the Alert Service Centre procedure between the MME, SMS-GMSC and SMS Router.

The SGSN, SMS-IW MSC, SMS-GMSC and SMS Router shall advertise support of the Diameter SGd Application over the Gdd interface 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 SGSN, SMS-GMSC and SMS Router shall additionally advertise support of the Diameter S6c Application over the Gdd interface if they support the Alert Service Centre procedure between the SGSN, SMS-GMSC and SMS Router.

The MTC-IWF and SMS-IW MSC shall advertise support of the Diameter SGd Application over the T4 interface if they support the MO-Forward-Short-Message procedure between the SMS-IW MSC and the MTC-IWF.

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 IETF RFC 6733 [20].

4.8 Diameter Application Identifier

The S6c and the SGd/Gdd interface protocols shall be defined, each, 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 S6c Diameter application is 16777312 (allocated by IANA).

The Diameter application identifier assigned to the SGd Diameter application, which is also applicable to the Gdd and T4 interfaces is 16777313 (allocated by IANA).

4.9 Use of the Supported-Features AVP

When new functionality is introduced on the S6c or SGd Diameter applications, it should be defined as optional. If backwards incompatible changes can not be avoided, the new functionality shall be introduced as a new feature and support advertised with the Supported-Features AVP. The usage of the Supported-Features AVP on the S6c or SGd applications is consistent with the procedures for the dynamic discovery of supported features as defined in clause 7.2 of 3GPP TS 29.229 [5].

When extending the application by adding new AVPs for a feature, the new AVPs shall have the M bit cleared and the AVP shall not be defined mandatory in the command ABNF.

As defined in 3GPP TS 29.229 [5], the Supported-Features AVP is of type grouped and contains the Vendor-Id, Feature-List-ID and Feature-List AVPs. On all reference points as specified in this specification, the Supported-Features AVP is used to identify features that have been defined by 3GPP and hence, for features defined in this document, the Vendor-Id AVP shall contain the vendor ID of 3GPP (10415). If there are multiple feature lists defined for the reference point, the Feature-List-ID AVP shall differentiate those lists from one another.

The Table 5.3.3.13/1 defines the features applicable to the S6c interface for the feature list with a Feature-List-ID of 1.

5 Diameter based S6c interface between HSS and central SMS functions

5.1 Introduction

The S6c interface enables the retrieval of routing information for the transfer of short messages, the report of status of the delivery status of a short message and the alerting of the SMS-SC between the HSS, the SMS-GMSC and the SMS Router as described in 3GPP TS 23.040 [3].

5.2 Procedures description

5.2.1 Send Routing Info for SM procedure

5.2.1.1 General

This procedure shall be used between the SMS-GMSC or the IP-SM-GW and the HSS to retrieve the routing information needed for routing the short message to the serving MSC or MME or SGSN or SMSF. This procedure is also used between the SMS-GMSC and the SMS Router or the IP-SM-GW, and between the HSS and the SMS Router or the IP-SM-GW in order to enforce routing of the SM delivery via the HPLMN of the receiving MS.

This procedure is applicable to an IP-SM-GW for its SMS Router function when using the S6c interface.

This procedure is used according to the call flows described in 3GPP TS 23.040 [2] clause 10.

Table 5.2.1.1-1 specifies the involved information elements for the request.

Table 5.2.1.1-2 specifies the involved information elements for the answer.

This procedure is mapped to the commands Send-Routing-Info-for-SM-Request/Answer (SRR/SRA) in the Diameter application specified in clause 5.3.2.

Table 5.2.1.1-1: Send Routing Info for SM Request

Information element name	Mapping to Diameter AVP	Cat.	Description
MSISDN	MSISDN	C	This information element shall be present when the MSISDN exists and shall contain the MSISDN of the user.
IMSI	User-Name (See IETF RFC 6733 [20])	C	This information element shall be present when the MSISDN does not exist and shall contain - the IMSI of the user in the context of T4 device triggering (see 3GPP TS 23.682 [18]; - or the HSS ID value in the context of MSISDN-less SMS delivery in IMS (see 3GPP TS 23.204 [17]).
SMSMI Correlation ID	SMSMI-Correlation-ID	C	This information element indicates by its presence that the request is sent in the context of MSISDN-less SMS delivery in IMS (see 3GPP TS 23.204 [17]). This information element shall contain the SIP-URI of the (MSISDN-less) destination user. The SIP-URI of the originating user and the HSS-ID shall be absent from this information element.
Service Centre Address	SC-Address	M	This information element shall contain the Service Centre address.
SM-RP-MTI	SM-RP-MTI	C	This information element shall contain the RP-Message Type Indicator of the Short Message. It is used to distinguish a SM sent to the mobile station in order to acknowledge an MO-SM initiated by the mobile from a normal MT-SM.
SM-RP-SMEA	SM-RP-SMEA	C	This information element shall contain the RP-Originating SME-address of the Short Message Entity that has originated the SM. This information element shall be present if the SMS-GMSC supports receiving of the two numbers from the HSS. Used by the short message service relay sub-layer protocol it shall be formatted according to the formatting rules of address fields as described in 3GPP TS 23 040 [2].
SRR Flags	SRR-Flags	C	This Information Element contains a bit mask. See 5.3.3.4 for the meaning of the bits and the condition for each bit to be set or not.
SM-Delivery Not Intended	SM-Delivery-Not-Intended	O	This information element, when present, shall indicate that delivery of a short message is not intended. It further indicates whether only IMSI or only MCC+MNC are requested. This information element may be set by entities that request the service without intending to deliver a short message, and shall be evaluated by the SMS Router and may be evaluated by the HSS.
Supported Features	Supported-Features (See 3GPP TS 29.229 [5])	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 Info for SM Answer

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