ETSI TS 129 128 V16.4.1 (2021-12)

LTE;
Universal Mobile Telecommunications System (UMTS);
Mobility Management Entity (MME)
and Serving GPRS Support Node (SGSN) interfaces for
interworking with packet data networks and applications
(3GPP TS 29.128 version 16.4.1 Release 16)

Reference
RTS/TSGC-0429128vg41

Keywords
LTE,UMTS

ETSI

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Sous-Préfecture de Grasse (06) N° w061004871

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Contents

Foreword

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In the present document, modal verbs have the following meanings:

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shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

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may indicates permission to do something

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can indicates that something is possible

cannot indicates that something is impossible

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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.

1 Scope

The present document describes the Diameter-based interfaces between the SCEF/IWK-SCEF and other network entities such as MME/SGSN for the Architecture enhancements to facilitate communications with packet data networks and applications.

In particular, this document specifies the T6a interface between the MME and the SCEF, the T6ai interface between the MME and the IWK-SCEF, the T6b interface between the SGSN and the SCEF, the T6bi interface between the SGSN and the SCEF and the T7 interface between the SCEF and the IWK-SCEF. The procedures over those interfaces are defined in 3GPP TS 23.682 [2].

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 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications ".

[3] Void.

[4] 3GPP TS 29.229: "Cx and Dx interfaces based on the Diameter protocol; protocol details ".

[5] 3GPP TS 29.336: "Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications".

[6] 3GPP TS 29.228: "IP multimedia (IM) Subsystem Cx Interface; Signalling flows and Message Elements".

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

[8] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF".

[9] IETF RFC 7683: "Diameter Overload Indication Conveyance".

[10] 3GPP TS 29.212: "Policy and Charging Control (PCC); Reference points".

[11] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[12] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[13] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".

[14] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS protocol (BSSGP)".

[15] IETF RFC 7944: "Diameter Routing Message Priority".

[16] 3GPP TS 29.272: "Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".

[17] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol; Protocol details".

[18] Void.

[19] 3GPP TS 23.007: "Restoration procedures".

[20] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging applications".

[21] IETF RFC 5778: "Diameter Mobile IPv6: Support for Home Agent to Diameter Server Interaction".

[22] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging applications".

[23] 3GPP TS 32.253: "Telecommunication management; Charging management; Control Plane (CP) data transfer domain charging".

[24] 3GPP TS 23.003: "Numbering, addressing and identification".

[25] 3GPP TS 23.401: "GPRS enhancements for E-UTRAN access".

[26] 3GPP TS 29.172: "Location Services (LCS); Evolved Packet Core (EPC) LCS Protocol (ELP) between the Gateway Mobile Location Centre (GMLC) and the Mobile Management Entity (MME); SLg interface".

[27] 3GPP TS 29.338: "Diameter based protocols to support SMS capable MMEs".

[28] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[29] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[30] 3GPP TS 32.298: "Telecommunication Management; Charging Management; Charging Data Record (CDR) parameter description".

[31] IETF RFC 8583: "Diameter Load Information Conveyance".

[32] IETF RFC 6733: "Diameter Base Protocol".

[33] 3GPP TS 29.274: " Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply.

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].

DRMP Diameter Routing Message Priority
DSCP Differentiated Services Code Point

SCEF	Service Capability Exposure Function
IWK-SCEF	Interworking - SCEF

4 General Description

4.1 Introduction

The T6a/b reference point between the MME/SGSN and the SCEF, the T6ai/bi reference point between the MME/SGSN in the VPLMN and the IWK-SCEF and the T7 reference point between the IWK-SCEF and the SCEF are defined in the 3GPP TS 23.682 [2].

This document describes the Diameter-based T6a/b, T6ai/bi and T7 related procedures, message parameters and protocol specification.

An excerpt of the 3GPP Architecture for the enhancements to facilitate communications with packet data networks and applications, as defined in 3GPP TS 23.682 [2] is shown in Figure 4.1-1, where the relevant interfaces towards the SCEF/IWK-SCEF are highlighted.

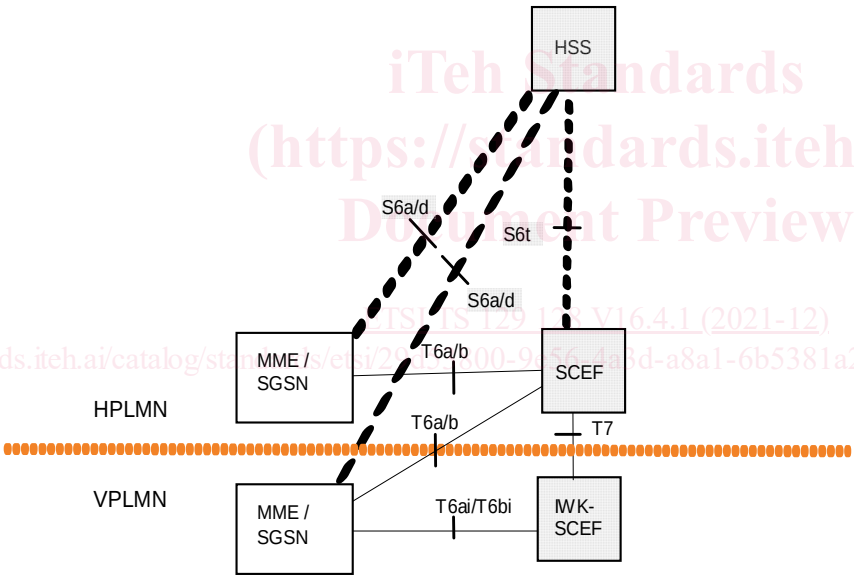

Figure 4.1-1: 3GPP Architecture for the enhancements to facilitate communications with packet data networks and applications

In this architecture, the T6a/b reference point connects the MME/SGSN with the SCEF.

The T6a/b interface shall allow the SCEF:

- to receive reports of the monitoring events from the MME/SGSN configured via an HSS;
- to configure the monitoring events at an MME/SGSN which are not UE related in the non roaming cases;
- to manage a connection between the MME and the SCEF on T6a;
- to send MT data on T6a;
- to receive MO data on T6a.

The T6ai/bi reference point connects the MME/SGSN with the IWK-SCEF in the visited network, if the IWK-SCEF is deployed.

The T6ai/bi interface shall allow the IWK-SCEF to:

- to receive configuration of the monitoring events from the MME or the SGSN and perform a filtering of the services which are allowed for this subscriber in this visited network based on roaming policies;
- to receive reports of the monitoring events from the MME/SGSN that are configured via an HSS, perform a filtering and forward them to the SCEF (in the home network which has configured the event) via the T7 reference point;
- to receive MO data on T6ai/bi and forward them to the SCEF;
- to receive MT data and forward them to the MME on T6ai/bi;
- to manage a connection between MME/SGSN and IWK-SCEF on T6ai/bi and forward connection management commands to the SCEF.

The T7 reference point connects the IWK-SCEF in the visited network with the SCEF in the home network.

The T7 interface shall allow the IWK-SCEF to:

- to forward reports received on T6ai/bi to the SCEF indicated in the event report received on T6ai/T6bi;
- to receive MO data on T6ai/bi and forward them to the SCEF on T7;
- to receive MT data on T7 and forward them to the MME/SGSN;
- to manage connection between the SCEF and the IWK-SCEF on T7 and forward connection management commands to the MME/SGSN.

5 Procedures Description

5.1 Introduction

This clause describes the Diameter-based T6a, T6b, T6ai, T6bi and T7 interface related procedures and the Information elements exchanged between the 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 clause 6 of the 3GPP TS 29.228 [6].

5.2 Report Procedures

5.2.1 General

This procedure is used between the MME/SGSN and the SCEF, between the MME/SGSN and the IWK-SCEF and between the IWK-SCEF and the SCEF.

When the procedure is invoked by the MME or the SGSN, it is used for reporting:

- UE Loss of Connectivity;
- UE Reachability;
- Location of the UE and change in location of the UE;
- Communication Failure;
- Availability after DNN failure;

- Idle Status Indication;
- PDN Connectivity Status.

When the procedure is invoked by the IWK-SCEF, it is used for conveying the monitoring event reported by the MME or the SGSN to the SCEF, after applying the roaming policies configured at the IWK-SCEF.

This procedure is mapped to the commands Reporting-Information-Request/Answer in the Diameter application specified in clause 6. The tables 5.2.1-1 and 5.2.1-2 detail the involved information elements.

Table 5.2.1-1: Reporting Information Request

Information Element Name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 6.4.16)	User-Identifier	C	If present, this information element shall contain the identity of the UE. This is a grouped AVP containing the MSISDN or the External-Identifier.
Monitoring Event Report (see 3GPP TS 29.336 [5] clause 8.4.3)	Monitoring-Event-Report	C	If the Reporting-Information-Request is sent for reporting the monitoring events, the MME/SGSN and the IWK-SCEF shall include the monitoring event(s) reported towards the SCEF.
Supported Features (See 3GPP TS 29.229 [4])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.

Table 5.2.1-2: Reporting Information Answer

Information Element Name	Mapping to Diameter AVP	Cat.	Description
Result (See 6.3)	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 T6a/b 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.
Supported Features (See 3GPP TS 29.229 [4])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.
Monitoring Event Report Status	Monitoring-Event-Report-Status	O	If present, this information element shall contain the status of each individual monitoring event report received by the SCEF from the MME/SGSN.

5.2.2 Detailed Behaviour of the MME/SGSN

5.2.2.0 General

The MME/SGSN shall fill the Monitoring-Event-Report AVP according to the event reported as specified below. For all monitoring events, the SCEF-ID, the SCEF-Reference-ID/SCEF-Reference-ID-Ext and the Monitoring-Type AVPs shall be included. In addition, the event specific AVPs as listed below shall be included based on the type of event reported.

The MME/SGSN shall include the External-Identifier or the MSISDN if present in the subscription data received from the HSS.

If the MME/SGSN receives an Experimental-Result-Code set to DIAMETER_ERROR_SCEF_REFERENCE_ID_UNKNOWN within an RIA command, it shall delete the event stored for the indicated SCEF-ID and SCEF-Reference-ID/SCEF-Reference-ID-Ext (see 3GPP TS 23.007 [19]).

5.2.2.1 UE Loss of Connectivity

The following AVPs shall be present within the Monitoring-Event-Report AVP when the UE Loss of Connectivity event is reported:

- Monitoring-Type set to LOSS_OF_CONNECTIVITY (0)

The following AVPs may be present within the Monitoring-Event-Report AVP when the UE Loss of Connectivity event is reported:

- Loss-Of-Connectivity-Reason set to one of the values defined in 3GPP TS 29.336 [5]

5.2.2.2 UE Reachability

The following AVPs shall be present within the Monitoring-Event-Report AVP when the UE Reachability event is reported (regardless of the configured Monitoring-Type being UE_REACHABILITY (1) or UE_REACHABILITY_AND_IDLE_STATUS_INDICATION (8)):

- Monitoring-Type set to UE_REACHABILITY (1)
- Reachability-Information set to REACHABLE_FOR_DATA(1)

The following AVPs may be present within the Monitoring-Event-Report AVP when the UE Reachability event is reported:

- Maximum-UE-Availability-Time
- Reachability-Cause

5.2.2.3 Location Reporting

The following AVPs shall be present within the Monitoring-Event-Report AVP when the location event is reported:

- Monitoring-Type set to LOCATION_REPORTING (2)
- EPS-Location-Information

5.2.2.4 Communication Failure

The following AVPs shall be present within the Monitoring-Event-Report AVP when the Communication Failure event is reported

- Monitoring-Type set to COMMUNICATION_FAILURE (5)
- Communication-Failure-Information (see clause 6.4.3)

5.2.2.5 Availability after DDN failure

The following AVPs shall be present within the Monitoring-Event-Report AVP when the Availablability after DDN failure event is reported (regardless of the configured Monitoring-Type being AVAILABILITY_AFTER_DDN_FAILURE (6) or AVAILABILITY_AFTER_DDN_FAILURE_AND_IDLE_STATUS_INDICATION (9)):

- Monitoring-Type set to AVAILABILITY_AFTER_DDN_FAILURE (6)

5.2.2.6 Idle Status Indication

The following AVPs shall be present within the Monitoring-Event-Report AVP when the Idle Status Indication event is reported:

- Monitoring-Type set to UE_REACHABILITY_AND_IDLE_STATUS_INDICATION (8) or to AVAILABILITY_AFTER_DDN_FAILURE_AND_IDLE_STATUS_INDICATION (9), depending on the Monitoring-Type of the corresponding event configuration.