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Core Network and Interoperability Testing (INT);
Diameter Conformance testing for S6a interface;
(3GPP Release 10);
Part 2: Test Suite Structure (TSS) and Test Purposes (TP)

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Core Network and Interoperability Testing (INT).

The present document is part 2 of a multi-part deliverable covering the test specifications for the Diameter protocol on the S6a interface, as identified below:

Part 1: "Protocol Implementation Conformance Statement (PICS)";

Part 2: "Test Suite Structure (TSS) and Test Purposes (TP)";

Part 3: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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1 Scope

The present document provides the Test Suite Structure (TSS) and Test Purposes (TP) for the test specifications for the Diameter protocol on the S6a interface as specified in ETSI TS 129 272 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [4] and ETSI ETS 300 406 [5].

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 129 272 (V10.8.0): "Universal Mobile Telecommunications System (UMTS); LTE; Evolved Packet System (EPS); Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol (3GPP TS 29.272 version 10.8.0 Release 10)".

[2] ETSI TS 103 261-1: "Core Network and Interoperability Testing (INT); Diameter Conformance testing for S6a interface; (3GPP Release 10); Part 1: Protocol Implementation Conformance Statement (PICS)".

[3] ISO/IEC 9646-1: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".

[4] ISO/IEC 9646-7: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".

[5] ETSI ETS 300 406: "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

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

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TS 129 272 [1] and the following apply:

Abstract Test Method (ATM): Refer to ISO/IEC 9646-1 [3].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [3].

Implementation Under Test (IUT): Refer to ISO/IEC 9646-1 [3].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [3].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 129 272 [1] and the following apply:

TP	Test Purpose
TSS	Test Suite Structure

4 Test Suite Structure (TSS) and Test Purposes (TP)

4.1 Test Suite Structure

4.1.1 TP naming convention

TPs are numbered, starting at 001, within each group. Groups are organized according to the TSS.

Table 1: TP identifier naming convention scheme

Identifier:	**<TP>_<iut>_<scope>_<nn>**			
<tp>	=	Test Purpose:	fixed to "TP"	
<iut>	=	type of IUT:	MME or HSS	
<scope>	=	group	UL	Update Location
			CL	Cancel Location
			PUE	Purge UE
			ISD	Insert Subscriber Data
			DSD	Delete Subscriber Data
			AIR	Authentication Information Retrieval
			RES	Reset
			NOT	Notification
<nn>	=	sequential number	(01 to 99)	

4.1.2 Test strategy

As the base standard ETSI TS 129 272 [1] contains no explicit requirements for testing, the TPs were generated as a result of an analysis of the base standard and the PICS specification ETSI TS 103 261-1 [2].

4.1.3 TP structure

Each TP has been written in a manner which is consistent with all other TPs. The intention of this is to make the TPs more readable and checkable. A particular structure has been used which is illustrated in table 2. This table should be read in conjunction with any TP, i.e. please use a TP as an example to facilitate the full comprehension of table 2.

Table 2: Structure of a single TP

TP part	Text	Example
Header	**<Identifier>** **<clause number in base ETSI TS 129 272 [1]>** **<PICS reference>**	see table 1 **clause 5.2.1.1.2** **A.2/3**
Summary	*Short free text description of the test objective*	Verify that the IUT can successfully process all mandatory AVPs in a UL-Request received due to IP-CAN session establishment.
Initial condition (optional)	*Free text description of the condition that the IUT has reached before the test purpose applies.*	The IUT has received AF provisions information about the AF signalling flows between UE and AF.
Start point	Ensure that the IUT in the <state> *see IETF RFC 3588 [6], clause 5.6* *and/or further actions before stimulus* *if the action is sending/receiving* *see below for message structure*	 Open state having sent an AA-Request
Stimulus	<**trigger**>, *see below for message structure* *or* <goal>	on receipt of a Capabilities-Exchange-Request (see note 2) to require PCC supervision, etc.
Reaction	<**action**>. *if the action is sending* *see below for message structure* <next action>, *etc.*	sends, saves, does, etc.
Message structure	<message type> *a)* containing a(n) <avp name> AVP *b)* indicating <coding of the field> and *back to a) or b) (see note 3)*	Capabilities-Exchange-Answer, etc. (see note 2) Vendor-Id, etc.

NOTE 1: Text in italics will not appear in TPs and text between <> is filled in for each TP and may differ from one TP to the next.

NOTE 2: All messages shall be considered as "valid and compatible" unless otherwise specified in the test purpose. This includes the presence of all mandatory AVPs as specified in IETF RFC 3588 [6] and in ETSI TS 129 272 [1], clause 7.

NOTE 3: An AVP can be embedded into another AVP. This is expressed by indentations, e.g. if Message1 contains AVP1 and AVP2 where AVP1 has AVP3 embedded this will be expressed like this:
sends/receives Message 1
    containing AVP1
        containing AVP3
            indicating ...
    containing AVP2
        indicating ...

4.2 Test Purposes

4.2.0 PICS references

All PICS items referred to in this clause are as specified in ETSI TS 103 261-1 [2] unless indicated otherwise by another numbered reference. PICS items are only meant for test selection, therefore only PICS items with status optional or conditional are explicitly mentioned.

4.2.1 MME Role

4.2.1.0 Test Selection

IUT takes the role of the MME; PICS A.2/1

4.2.1.1 Update Location

Test Selection: IUT supports location management procedures; PICS A.3/1.

TP_MME_UL_01	**Standards Reference:** **5.2.1.1.1 and 7.2.3**	**PICS item:**
Summary:	Verify that the IUT can indicate request for update location information to inform HSS about the identity of the currently serving user.	
Test purpose:	Ensure that the IUT **to indicate** a request for update location information, **sends a UL-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Realm AVP containing a User-Name AVP containing a RAT-Type AVP containing a ULR-Flags AVP with S6a-indicator bit set containing a Visited-PLMN-ID AVP	
Comments:		

TP_MME_UL_02	**Standards Reference:** **5.2.1.1.2¶4**	**PICS item:** **A.2/1.2**
Summary:	Verify that the IUT due to an inter node (SGSN to MME) update sends UL-Request where "Single-Registration-Indication" is set.	
Test purpose:	Ensure that the IUT **to indicate** an inter node update, **sends a UL-Request** containing a ULR-Flags AVP with S6a-indicator bit set with Single-Registration-Indication bit set	
Comments:		

TP_MME_UL_03	**Standards Reference:** **5.2.1.1.2¶5**	**PICS item:**
Summary:	Verify that the IUT can indicate request for update location information which is sent due to an initial attach.	
Test purpose:	Ensure that the IUT **to indicate** a request for update location information due to an initial attach, **sends a UL-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Realm AVP containing a User-Name AVP containing a RAT-Type AVP containing a ULR-Flags AVP with S6a-indicator bit set with Initial-Attach-Indicator bit set containing a Visited-PLMN-ID AVP	
Comments:		

TP_MME_UL_04	**Standards Reference:** **5.2.1.1.2¶6**	**PICS item:** **A.2/1.1**
Summary:	Verify that the IUT, when subscriber data are already available due to previous location update, successfully processes additional request for update location information.	
Test purpose:	Ensure that the IUT **sends a UL-Request and** **on receipt of a UL-Answer** **to indicate** additional request for update location information, **sends a UL-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Realm AVP containing a User-Name AVP containing a RAT-Type AVP containing a ULR-Flags AVP with S6a-indicator bit set with Skip-Subscriber-Data bit set containing a Visited-PLMN-ID AVP	
Comments:		

TP_MME_UL_05	**Standards Reference:** **5.2.1.1.2¶7**	**PICS item:** **A.2/1.1 and A.3/1.1**
Summary:	Verify that the IUT, that has chosen the option to include the SSGN number within ULR request is prepared to receive a single subscription data update message IDR from HSS when the subscription data is modified.	
Test purpose:	Ensure that the IUT **sends a UL-Request** containing a SGSN-Number AVP **on receipt of a UL-Answer and** **on receipt of an ID-Request** **sends an ID-Answer**	
Comments:		

TP_MME_UL_06	**Standards Reference:** **5.2.1.1.2¶7**	**PICS item:** **A.2/1.1 and A.3/1.1**
Summary:	Verify that the IUT, that has chosen the option to include the SSGN number within ULR request is prepared to receive a single subscription data update message DSR from HSS when the subscription data is modified.	
Test purpose:	Ensure that the IUT **sends a UL-Request** containing a SGSN-Number AVP **on receipt of a UL-Answer and** **on receipt of an DS-Request** **sends an DS-Answer**	
Comments:		

TP_MME_UL_07	**Standards Reference:** **5.2.1.1.2¶10**	**PICS item:** **NOT A.2/1.1**
Summary:	Verify that the standalone IUT, does not indicate its support for any SGSN specific features and does not request explicitly the download of GPRS data.	
Test purpose:	Ensure that the IUT **sends a UL-Request** containing a ULR-Flags AVP with S6a-indicator bit set with GPRS-Subscription-Data-Indicator bit **not** set with Node-Type-Indicator bit **not** set	
Comments:		

4.2.1.2 Cancel Location

Test Selection: IUT supports cancel location procedures; PICS A.3/2.

TP_MME_CL_01	**Standards Reference:** **Table 5.2.1.2.1/2 and 5.2.1.2.2¶2 and 7.2.8**	**PICS item:**
Summary:	Verify that the IUT when receiving Cancel location request checks whether the IMSI is known and if not the IUT shall return Cancel location response with all mandatory AVPs and with appropriate result code.	
Test purpose:	Ensure that the IUT **on receipt of a CL-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Host AVP containing a Destination-Realm AVP containing a User-Name AVP indicating not known IMSI containing a Cancelation-Type AVP, **sends a CL-Answer** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Result-Code AVP indicating DIAMETER_SUCCESS	
Comments:		

TP_MME_CL_02	**Standards Reference:** **Table 5.2.1.2.1/2 and 5.2.1.2.2¶3 and 7.2.8**	**PICS item:**
Summary:	Verify that the IUT when receiving Cancel location request checks whether the IMSI is known and if cancelation type of "Initial attach procedure" is received then the IUT shall return Cancel location response with appropriate result code.	
Test purpose:	Ensure that the IUT **on receipt of a CL-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Host AVP containing a Destination-Realm AVP containing a User-Name AVP indicating known IMSI containing a Cancelation-Type AVP indicating INITIAL_ATTACH_PROCEDURE, **sends a CL-Answer** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Result-Code AVP indicating DIAMETER_SUCCESS	
Comments:		

4.2.1.3 Purge UE

Test Selection: IUT supports Purge UE procedures; PICS A.3/3.

TP_MME_PUE_01	Standards Reference: Table 5.2.1.3.1/1 and 7.2.13	PICS item:
Summary:	Verify that the IUT can indicate request for purge UE procedure.	
Test purpose:	Ensure that the IUT **to indicate** a request for purge UE procedure, **sends a PU-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Realm AVP containing a User-Name AVP	
Comments:		

TP_MME_PUE_02	Standards Reference: 5.2.1.3.2¶1	PICS item:
Summary:	Verify that the IUT makes use of UE Purge procedure and sets appropriate flag when the subscription profile is deleted from database or after long UE inactivity.	
Test purpose:	Ensure that the IUT **to indicate** a request for purge UE procedure, **sends a PU-Request** containing a PUR-Flags AVP with "UE Purged in MME" bit set	
Comments:		

TP_MME_PUE_03	Standards Reference: 5.2.1.3.2¶3	PICS item: A.2/1.1
Summary:	Verify that the IUT makes use of UE Purge procedure and sets appropriate flags when the subscription profile is deleted from database or after long UE inactivity on all registered accesses.	
Test purpose:	Ensure that the IUT **to indicate** a request for purge UE procedure, **sends a PU-Request** containing a PUR-Flags AVP with "UE Purged in MME" bit set with "UE Purged in SGSN" bit set	
Comments:		

TP_MME_PUE_04	Standards Reference: 5.2.1.3.2¶3	PICS item: A.2/1.1 and A.4/13
Summary:	Verify that in case when HSS indicates support for Partial Purge feature IUT may also indicate a Purge of the UE in only one of the serving nodes in the combined node (either in the MME or in the SGSN).	
Test purpose:	Ensure that the IUT **to indicate** a request for update location information, **sends a UL-Request** **on receipt of a UL-Answer** containing a Supported-Features AVP containing a Vendor-Id AVP containing a Feature-List-ID AVP containing a Feature-List AVP indicating Partial Purge **sends a PU-Request** containing a PUR-Flags AVP either with "UE Purged in MME" bit set or with "UE Purged in SGSN" bit set	
Comments:		

4.2.1.4 Insert Subscriber Data

Test Selection: IUT supports subscriber data handling procedures; PICS A.3/4.

TP_MME_ISD_01	**Standards Reference:** **Table 5.2.2.1.1/2 and 5.2.2.1.2¶4 and 7.2.10**	**PICS item:**
Summary:	Verify that the IUT when receiving an ID-Request checks whether the IMSI is known and returns Insert Subscriber Data response with all mandatory AVPs and with appropriate result code.	
Test purpose:	Ensure that the IUT **on receipt of an ID-Request** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Destination-Host AVP containing a Destination-Realm AVP containing a User-Name AVP indicating known IMSI containing a Subscription-Data AVP, **sends an ID-Answer** containing a Session-ID AVP containing an Auth-Session-State AVP indicating NO_STATE_MAINTAINED containing an Origin-Host AVP containing an Origin-Realm AVP containing a Result-Code AVP indicating DIAMETER_SUCCESS	
Comments:		

TP_MME_ISD_02	**Standards Reference:** **5.2.2.1.2¶1,2 and 7.4.3**	**PICS item:**
Summary:	Verify that the IUT when receiving an ID-Request checks whether the IMSI is known and if not the IUT returns Insert Subscriber Data response with appropriate result code.	
Test purpose:	Ensure that the IUT **on receipt of an ID-Request** containing a User-Name AVP indicating not known IMSI, **sends an ID-Answer** **not** containing a Result-Code AVP containing an Experimental-Result AVP containing an Experimental-Result-Code AVP indicating DIAMETER_ERROR_USER_UNKNOWN	
Comments:		