



**Core Network and Interoperability Testing (INT);
Diameter Conformance testing for Cx and Dx interfaces;
(3GPP™ Release 10);
Part 2: Test Suite Structure (TSS) and Test Purposes (TP)**

PREVIEW
iTechStandards.com
https://standards.iteh.ai/en/standards/etsi/103-289-2-v2.1.1-
fc4d-418b-8b87-b499134e8a20/20160717

Reference

RTS/INT-00128-2

Keywords

diameter, TSS&TP

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

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	4
1 Scope	5
2 References	5
2.1 Normative references	5
2.2 Informative references.....	5
3 Definitions and abbreviations.....	6
3.1 Definitions	6
3.2 Abbreviations	6
4 Test configurations.....	6
4.1 Introduction	6
4.2 Test configurations using Cx interface.....	7
4.3 Test configurations using the Dx interface	8
5 Test Suite Structure (TSS) and Test Purposes (TP)	9
5.1 Test Suite Structure	9
5.1.1 TP naming convention	9
5.1.2 Test strategy.....	9
5.1.3 TP structure.....	9
5.2 Test Purposes.....	10
5.2.0 PICS references	10
5.2.1 Cx Interface	11
5.2.1.1 HSS Role.....	11
5.2.1.1.0 Test Selection	11
5.2.1.1.1 Message Syntax	11
5.2.1.1.2 User Authorization	12
5.2.1.1.3 Server assignment.....	29
5.2.1.1.4 Registration Termination.....	38
5.2.1.1.5 Location Information.....	42
5.2.1.1.6 Push Profile	47
5.2.1.1.7 Multimedia authentication	50
5.2.1.1.8 Error Handling.....	56
5.2.1.2 CSCF Role	57
5.2.1.2.0 Test Selection	57
5.2.1.2.1 Message Syntax	57
5.2.1.2.2 User Authorization	58
5.2.1.2.3 Server assignment.....	60
5.2.1.2.4 Registration Termination.....	62
5.2.1.2.5 Location Information.....	63
5.2.1.2.6 Push Profile	64
5.2.1.2.7 Multimedia Authentication.....	66
5.2.2 Dx Interface	68
5.2.2.1 SLF Role	68
5.2.2.1.0 Test Selection	68
5.2.2.1.1 User Authorization	69
5.2.2.1.2 Server assignment.....	70
5.2.2.1.3 Location Information.....	71
5.2.2.1.4 Multimedia authentication.....	72
5.2.2.2 CSCF Role	72
5.2.2.2.0 Test Selection	72
5.2.2.2.1 User Authorization	73
5.2.2.2.2 Server assignment.....	73
5.2.2.2.3 Location Information.....	73
5.2.2.2.4 Multimedia authentication.....	74
History	75

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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 Cx and Dx interfaces, 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) pro forma 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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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 Cx and Dx interfaces as specified in ETSI TS 129 228 [1] and ETSI TS 129 229 [2] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [5] and ETSI ETS 300 406 [6].

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 referenced 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>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

- [1] ETSI TS 129 228 (V10.8.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents (3GPP TS 29.228 version 10.8.0 Release 10)".
- [2] ETSI TS 129 229 (V10.5.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Cx and Dx interfaces based on the Diameter protocol; Protocol details (3GPP TS 29.229 version 10.5.0 Release 10)".
- [3] ETSI TS 103 289-1: "Core Network and Interoperability Testing (INT); Diameter Conformance testing for Cx and Dx interfaces; (3GPP Release 10); Part 1: Protocol Implementation Conformance Statement (PICS)".
- [4] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [5] ISO/IEC 9646-7: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".
- [6] ETSI ETS 300 406: "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".
- [7] 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 referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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.

- [i.1] IETF RFC 2617: "HTTP Authentication: Basic and Digest Access Authentication".

- [i.2] ETSI TS 133 203: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; 3G security; Access security for IP-based services (3GPP TS 33.203)".
- [i.3] IETF RFC 4005: "Diameter Network Access Server Application".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TS 129 228 [1], ETSI TS 129 229 [2] and the following apply:

Abstract Test Method (ATM): Refer to ISO/IEC 9646-1 [4].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [4].

Implementation Under Test (IUT): Refer to ISO/IEC 9646-1 [4].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [4].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 129 228 [1], ETSI TS 129 229 [2] and the following apply:

TP	Test Purpose
TSS	Test Suite Structure

4 Test configurations

4.1 Introduction

Test purposes of the present document address the IMS functional entities that are accessible via the following standardized DIAMETER interfaces: Cx and Dx and SIP interfaces: Gm.

This clause introduces the test configurations that have been used for the definition of test purposes. Depending on the specific configuration the test system (TS) simulates the behaviour of one or more CSCFs, HSS or SLF communicating with the system under test (SUT).

NOTE: In a real operating network the different Diameter nodes would not connect directly to each other. The connection is usually proxied through one or more Diameter Agents. In the following test architecture figures the Diameter Agent is not explicitly depicted as it is seen as a transparent message handler for conformance testing purposes.

4.2 Test configurations using Cx interface

The Cx interface is located between a CSCF and the HSS.

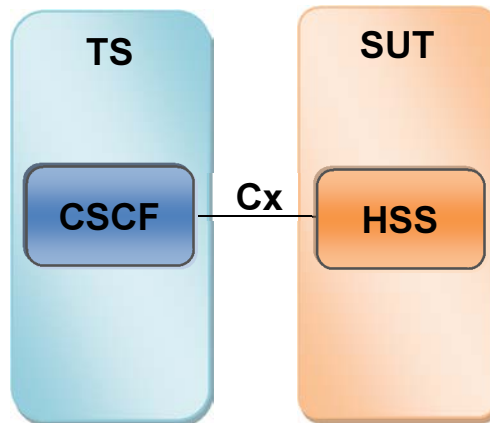


Figure 1: Test configuration CF_1Cx

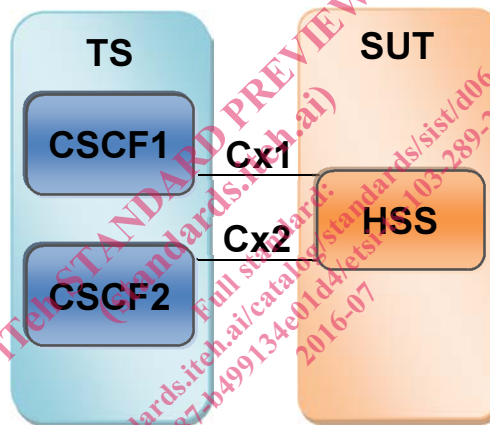


Figure 2: Test configuration CF_2Cx

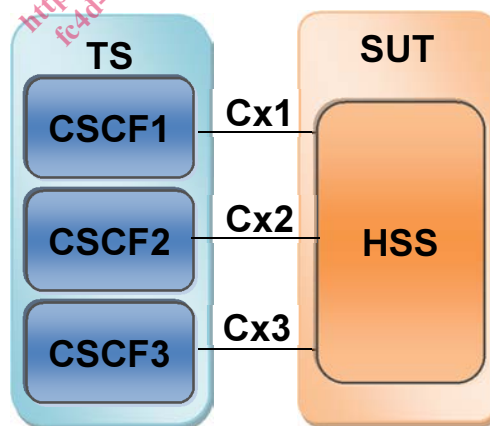


Figure 3: Test configuration CF_3Cx

NOTE 1: Within figure 3 CSCF represents one I-CSCF and two S-CSCF components. Cx interface(DIAMETER protocol) is located between an HSS and I-CSCF or between an HSS and S-CSCF.

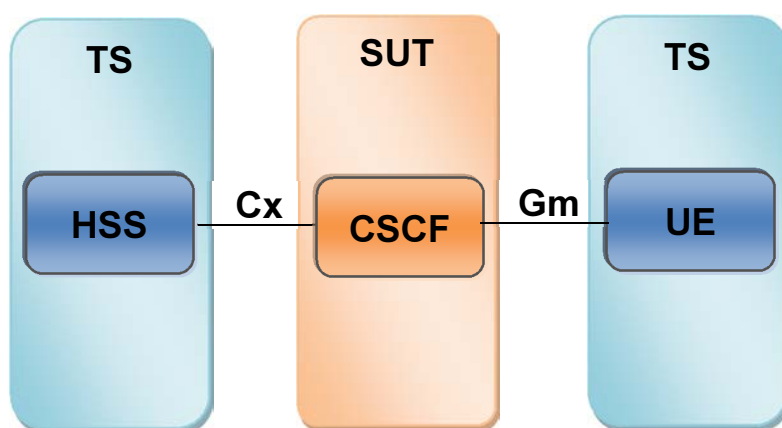


Figure 4: Test configuration CF_1Cx1Gm

NOTE 2: Within figure 4 CSCF represents P-CSCF, I-CSCF and S-CSCF components. Gm interface(SIP protocol) is located between a UE and P-CSCF. Cx interface(DIAMETER protocol) is located between an HSS and I-CSCF or between an HSS and S-CSCF.

4.3 Test configurations using the Dx interface

The Dx interface is located between a CSCF and the SLF

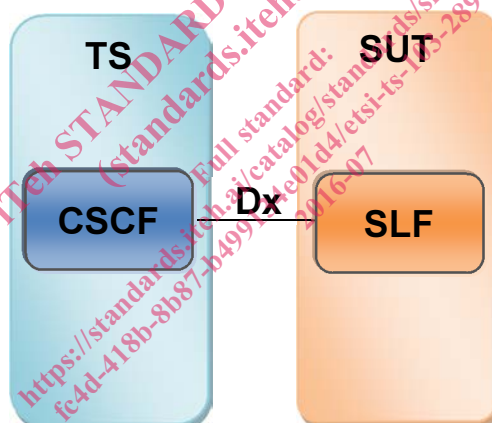


Figure 5: Test configuration CF_1Dx

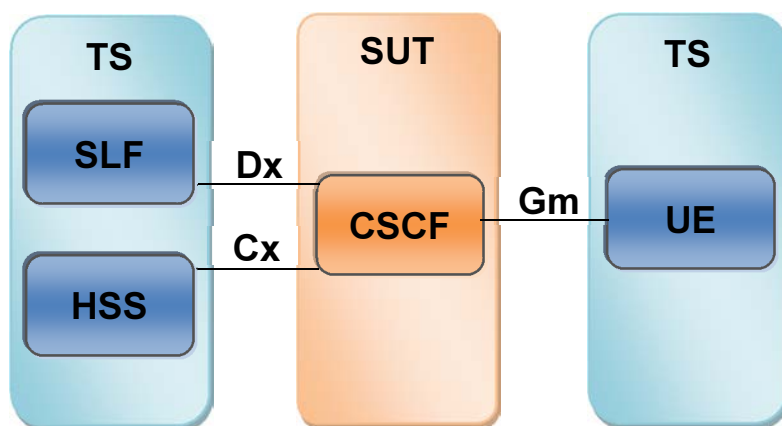


Figure 6: Test configuration CF_1Dx1Cx1Gm

NOTE: Within figure 5 CSCF represents P-CSCF, I-CSCF and S-CSCF components. Gm interface(SIP protocol) is located between a UE and P-CSCF. Cx interface(DIAMETER protocol) is located between an HSS and I-CSCF or between an HSS and S-CSCF. Dx interface(DIAMETER protocol) is located between an SLF and I-CSCF or between an SLF and S-CSCF.

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

5.1 Test Suite Structure

5.1.1 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>_<interface>_<iut>_<scope>_<nn>			
<tp>	=	Test Purpose:	fixed to "TP"
<Interface>	=	Interface:	CX or DX
<iut>	=	type of IUT:	HSS, SLF or CSCF
<scope>	=	group	MS Message syntax UA User Authorization commands SA Server Assignment commands RT Registration Termination commands LI Location Information commands PP Push Profile commands MA Multimedia authentication commands ER Error Handling
<nn>	=	sequential number	(01 to 99)

5.1.2 Test strategy

As the base standards ETSI TS 129 228 [1] and ETSI TS 129 229 [2] contain 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 103 289-1 [3].

5.1.3 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 129 228 [1] > <PICS reference>	see table 1 clause 5.2.1.1.2 (see note 4) A.2/3
Summary	<i>Short free text description of the test objective</i>	Verify that the IUT processes all mandatory AVPs in an UL-Request received due to IP-CAN session establishment.
Initial condition (optional)	<i>Free text description of the condition that the IUT has reached before the test purpose applies.</i>	The IUT has received AF provisions information about the AF signalling flows between UE and AF.
Configuration (optional)	<i>Short name of test configuration related to the clause 4 of the present document</i>	CF_1Cx1Gm
Start point	Ensure that the IUT in the <state> see IETF RFC 3588 [7], clause 5.6 and/or further actions before e stimulus if the action is sending/receiving see below for message structure <trigger>, see below for message structure	Open state having sent an AA-Request
Stimulus	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 are 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 [7] and in ETSI TS 129 229 [2]. 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 ... NOTE 4: In addition to the clause number there could be specified also following syntaxes: a) Paragraph symbol ¶ can appear after clause number to make reference more precise. A paragraph consists of one or more sentences and paragraph ends with newline. b) Syntax like "item X-Y-Z-..." could be also part of reference and it can stand beside clause where X specifies item number and Y and Z are standing to represent number of dashed line. (ex. "item 3-4-1" points to the item 3 and 4th dashed line and 1st dashed line present within previously mentioned 4th dashed line) above syntax can be present within parenthesis or separated with/symbol.		

5.2 Test Purposes

5.2.0 PICS references

All PICS items referred to in this clause are as specified in ETSI TS 103 289-1 [3] 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.

5.2.1 Cx Interface

5.2.1.1 HSS Role

5.2.1.1.0 Test Selection

IUT takes the role of the HSS; PICS A.2/1 and applicable test configuration is CF_2Cx if not specified differently in the TP.

HSS shall be properly provisioned for all specified tests.

5.2.1.1.1 Message Syntax

TP_CX_HSS_MS_01	Standards Reference: clause 6 ¶ 2	PICS item:
Summary:	Verify that the IUT sends the appropriate Result-Code AVP when mandatory Visited-Network-Identifier AVP is absent.	
Configuration:	CF_1Cx	
Test purpose:	Ensure that the IUT on receipt of a UA-Request containing a Session-ID AVP containing a Public-Identity AVP indicating the public user identity to be registered not containing a Visited-Network-Identifier AVP containing a User-Authorization-Type AVP indicating REGISTRATION containing a User-Name AVP indicating the private user identity containing a Destination-Host AVP containing a Destination-Realm AVP containing a UAR-Flags AVP with IMS-Emergency-Registration bit not set sends a UA-Answer containing a Result-Code AVP indicating DIAMETER_MISSING_AVP containing a Failed AVP indicating missing Visited-Network-Identifier AVP.	
Comments:		

TP_CX_HSS_MS_02	Standards Reference: clause 6 ¶ 2	PICS item:
Summary:	Verify that the IUT sends the appropriate Result-Code AVP when mandatory Public-Identity AVP is absent.	
Configuration:	CF_1Cx	
Test purpose:	Ensure that the IUT on receipt of a UA-Request containing a Session-ID AVP not containing a Public-Identity AVP containing a Visited-Network-Identifier AVP indicating the domain name of the visited network containing a User-Authorization-Type AVP indicating REGISTRATION containing a User-Name AVP indicating the private user identity containing a Destination-Host AVP containing a Destination-Realm AVP containing a UAR-Flags AVP with IMS-Emergency-Registration bit not set sends a UA-Answer containing a Result-Code AVP indicating DIAMETER_MISSING_AVP containing a Failed AVP indicating missing Public-Identity AVP.	
Comments:		

5.2.1.1.2 User Authorization

In the test purposes below, an HSS properly provisioned means:

- Some users profile with barred Public User Identity are defined.
- Some users profile with barred Public User Identity and not allowed to roam are defined.
- Some users profile with barred Public User Identity and not allowed to register are defined.
- Some users profile with not barred Public User Identity are defined.

In addition, an Initial registration involves that there is no previously assigned S-CSCF for this user (first registration).

TP_CX_HSS_UA_01	Standards Reference: clause 6.1.1 and tables 6.1.1.1 and 6.1.1.2 and ETSI TS 129 229 [2], clauses 6.1.1 and 6.1.2	PICS item:
Summary:	Verify that the IUT successfully processes all mandatory AVPs in a UA-Request received due to an UE initial registration.	
Configuration:	CF_1Cx	
Test purpose:	Ensure that the IUT on receipt of a UA-Request - containing a Session-ID AVP - containing a Vendor-Specific-Application-Id AVP - containing an Auth-Session-State AVP - indicating NO_STATE_MAINTAINED - containing an Origin-Host AVP - containing an Origin-Realm AVP - containing a Public-Identity AVP - indicating the public user identity to be registered - containing a Visited-Network-Identifier AVP - indicating the domain name of the visited network - containing a User-Authorization-Type AVP - indicating REGISTRATION - containing a User-Name AVP - indicating the private user identity - containing a Destination-Host AVP - containing a Destination-Realm AVP - containing a UAR-Flags AVP - with IMS-Emergency-Registration bit not set sends a UA-Answer - containing a Session-ID AVP - containing a Vendor-Specific-Application-Id AVP - containing an Auth-Session-State AVP - containing an Origin-Host AVP - containing an Origin-Realm AVP not containing a Result-Code AVP - containing an Experimental-Result AVP - containing an Experimental-Result-Code AVP - indicating DIAMETER_FIRST_REGISTRATION.	
Comments:	IMS UE Action: Initial registration The I-CSCF does not request for S-CSCF capabilities.	