ETSI TS 103 497-3 V1.1.1 (2017-07)

TECHNICAL SPECIFICATION

**Core Network and Interoperability Testing (INT);
S1AP Conformance Testing for the S1-MME interface;
(3GPP™ Release 13);
Part 3: Abstract Test Suite (ATS) and partial Protocol
Implementation eXtra Information for Testing (PIXIT)
pro forma specification**

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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 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [2].

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 specifies the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) pro forma for the test specification for the S1AP protocol on the S1-MME interface as specified in ETSI TS 136 413 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [6] and ETSI ETS 300 406 [7].

The test notation used in the ATS is TTCN-3 (see ETSI ES 201 873-1 [8]).

The following test specification and design considerations can be found in the body of the present document:

- the overall test suite structure;

- the testing architecture;

- the test methods and port definitions;

- the test configurations;

- TTCN styles and conventions;

- the partial PIXIT pro forma;

- the modules containing the TTCN-3 ATS.

Annex A provides the Partial Implementation Extra Information for Testing (PIXIT) Pro forma.

Annex B provides the Abstract Test Suite (ATS) part of the ATS.

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 https://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 136 413 (V13.4.0): "LTE; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP) (3GPP TS 36.413 version 13.4.0 Release 13)".

[2]   ETSI TS 103 497-1: "Core Network and Interoperability Testing (INT); S1AP Conformance Testing for the S1-MME interface; (3GPPTM Release 13); Part 1: Protocol Implementation Conformance Statement (PICS)".

[3]   ETSI TS 103 497-2: "Core Network and Interoperability Testing (INT); S1AP Conformance Testing for the S1-MME interface; (3GPPTM Release 13); Part 2: Test Suite Structure (TSS) and Test Purposes (TP)".

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

[5]   ISO/IEC 9646-6: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".

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

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

[8]   ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".

[9]   ETSI TS 136 304: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode (3GPP TS 36.304)".

[10]   ETSI TS 123 003: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Numbering, addressing and identification (3GPP TS 23.003)".

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.

Not applicable.

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in ISO/IEC 9646-7 [6] and ETSI TS 136 413 [1] apply.

3.2   Abbreviations

For the purposes of the present document, the abbreviations given in ISO/IEC 9646-1 [4], ISO/IEC 9646-6 [5], ISO/IEC 9646-7 [6] and ETSI TS 136 413 [1] apply.

4   Abstract Test Method (ATM)

4.1   Introduction

This clause describes the ATM used to test the S1AP protocol on the S1-MME interface at the eNB and MME side.

4.2   Test architecture

4.2.1   Test method

Void.

5   ATS conventions

5.1   Introduction

The ATS conventions are intended to give a better understanding of the ATS but they also describe the conventions made for the development of the ATS. These conventions shall be considered during any later maintenance or further development of the ATS.

The ATS conventions contain two clauses, the testing conventions and the naming conventions. The naming conventions describe the structure of the naming of all ATS elements.

To define the ATS, the guidelines of the document ETSI ETS 300 406 [7] were considered.

5.2   Testing conventions

5.2.1   Test cases Preamble and Postamble

As described in the test method clause the test tool shall behave as an eNB when the IUT is an MME and shall behave as an MME when the IUT is an eNB. For that reason the test case preambles and postambles are named as follows:

  IUT is an S1AP/eNB (example TC_S1AP_eNB_RAB_01)

       `f_cf_S1AP_eNB_Up`

       `f_cf_Down`

  IUT is a S1AP/MME (example TC_S1AP_MME_RAB_01)

       `f_cf_S1AP_MME_Up`

       `f_cf_Down`

5.3   Naming conventions

5.3.1   General guidelines

The naming conventions are based on the following underlying principles:

- In most cases, identifiers should be prefixed with a short alphabetic string (specified in table 1) indicating the type of TTCN-3 element it represents.

- Suffixes should not be used except in those specific cases identified in table 2.

- Prefixes and suffixes should be separated from the body of the identifier with an underscore ("_").

  EXAMPLE 1:   `c_sixteen, t_wait_max`.

- Only module names, data type names and module parameters should begin with an upper-case letter. All other names (i.e. the part of the identifier following the prefix) should begin with a lower-case letter.

- The start of second and subsequent words in an identifier should be indicated by capitalizing the first character. Underscores should not be used for this purpose.

  EXAMPLE 2:   `f_send_Location_Reporting_Control`.

Table 1 specifies the naming guidelines for each element of the TTCN-3 language indicating the recommended prefix, suffixes (if any) and capitalization.

Table 1: TTCN-3 naming convention

Language element	Naming convention	Prefix	Suffix	Example	Notes
Module	Use upper-case initial letter	LibS1AP_	*none*	LibS1AP_Interface	
TSS grouping	Use all upper-case letters	*none*	*none*	S1AP_eNB_RAB	
Message template	Use lower-case initial letter	m_	none	m_E_RABSetupRequest	
Message template with wildcard or matching expression	Use lower-case initial letters	mw_	none	mw_servedGUMMEIsItem	
Port instance	Use upper-case initial letter	*none*	*none*	S1APPort	
Constant	Use lower-case initial letter	c_	*none*	c_maxRetransmission	
Function	Use lower-case initial letter	f_	*none*	f_recv_S1AP_PDU()	
Altstep	Use lower-case initial letter	a_	*none*	a_receive()	
Variable	Use lower-case initial letter	v_	*none*	v_basicId	
PICS values	Use all upper case letters	*PICS_*	none	PICS_S1AP_MME_IUT	See note
PIXIT values	Use all upper case letters	*PX_*	none	PX_S1AP_MME_ETS_PORT	See note
Parameterization	Use lower-case initial letter	p_	*none*	p_servedPLMNs	
Enumerated Value	Use lower-case initial letter	e_	*none*	e_preamble	
NOTE: In this case it is acceptable to use underscore as a word delimiter.					

5.3.2 Test case grouping

The ATS structure is based on the Test Purposes for the S1AP protocol on the S1-MME interface as defined in ETSI TS 103 497-2 [3].

5.3.3 Test case identifiers

The test cases have been divided according to the functionalities into several groups.

The test case names are built up according to the following scheme.

Table 2: TC identifier naming convention scheme

```
Identifier:  <TC>_<iut>_<scope>_<nn>
   <tp>      =    Test Case:         fixed to "TC"
   <interface>    Interface:         S1AP
   <iut>     =    type of IUT:       eNB or MME
   <scope>        =   group          RAB     E-RAB management

                                     MNP     Management procedure

                                     STP     CDMA2000 tunneling

                                     etc.



   <nn>      =    sequential number  (01 to 99)
```

NOTE: This naming scheme results into a one-to-one correspondence between the test purpose identifiers as defined in ETSI TS 103 497-2 [3] and the test case identifiers.
The TP identifier of the test case TC_xxx_01 is TP_xxx_01.

Annex A (normative):
S1AP S1-MME Partial PIXIT pro forma

A.1 The right to copy

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the Partial PIXIT pro forma in this annex so that it can be used for its intended purposes and may further publish the completed Partial PIXIT.

The PIXIT Pro forma is based on ISO/IEC 9646-6 [5]. Any additional information which may be needed can be found in this international standard document.

A.2 Identification summary

Table A.1

PIXIT Number:	
Test Laboratory Name:	
Date of Issue:	
Issued to:	

A.3 ATS summary

Table A.2

Protocol Specification:	ETSI TS 136 413 [1] version 13.4.0 (Release 13)
Protocol to be tested:	S1AP
ATS Specification:	ETSI TS 103 497-2 [3]
Abstract Test Method:	ETSI TS 103 497-3, clause 4

A.4 Test laboratory

Table A.3

Test Laboratory Identification:	
Test Laboratory Manager:	
Means of Testing:	
SAP Address:	

A.5 Client identification

Table A.4

Client Identification:	
Client Test manager:	
Test Facilities required:	

A.6   SUT

Table A.5

Name:	
Version:	
SCS Number:	
Machine configuration:	
Operating System Identification:	
IUT Identification:	
PICS Reference for IUT:	
Limitations of the SUT:	
Environmental Conditions:	

A.7   Protocol layer information

A.7.1   Protocol identification

Table A.6

Name:	ETSI TS 136 413 [1]: "LTE; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)"
Version:	Version 13.4.0 (Release 13)
PICS References:	ETSI TS 103 497-1 [2]

A.8   PIXIT items

A.8.1   Introduction

Tables in this clause need to be filled by the IUT Manufacturer to specify how the IUT needs to be configured with IUT specific values or describe IUT specific procedures required for complete testing of the IUT.

Each PIXIT item corresponds to a Module Parameter of the ATS.

A.8.2   Port and Address items

Table A.7: Test system ports and addresses

Item	Identifier	Type	Description
1	PX_S1AP_ETS_IPADDR	Charstring	IP address of the eNB/MME test system
2	PX_S1AP_ETS_PORT	Integer	Port number of the eNB/MME test system
3	PX_S1AP_ETS_IPADDR2	Charstring	IP address of the second eNB test system
4	PX_S1AP_ETS_PORT2	Integer	Port number of the second eNB test system
5	PX_VA	Integer	Variant selection
6	PX_VA_CRITICALITY	Enum	Criticality for variant selection
7	PX_TS1RELOCOverall	Float	Timer TS1RELOCOverall

Table A.8: SUT ports and addresses

Item	Identifier	Type	Description
1	PX_S1AP_SUT_IPADDR	Charstring	IP address of the eNB/MME system under test
2	PX_S1AP_SUT_PORT	Integer	Port number of the eNB/MME system under test

A.8.3 LibCommon items

Table A.9: PIXIT for LibCommon

Item	Identifier	Type	Description
1	PX_TSYNC_TIME_LIMIT	Float	Default time limit for a sync client to reach a synchronization point
2	PX_TSHUT_DOWN_TIME_LIMIT	Float	Default time limit for a sync client to finish its execution of the shutdown default

A.8.4 LibS1AP items

Table A.10: PIXIT for LibS1AP

Item	Identifier	Type	Description
1	PX_IPv6	Bool	IPv6 used
2	PX_S1AP_TRANSPORT_PROTOCOL	Enum	
3			
4	PX_S1AP_TWAIT	Float	Timer for waiting an operator action
5			
6	PX_PLMN_IDENTITY	Charstring	PLMN Identity
7	PX_PLMN_IDENTITY_UNKNOWN	Charstring	Unknown PLMN Identity
8	PX_eNB_ID	Bitstring	eNB Identity
9	PX_eNB_ID_UNKNOWN	Bitstring	Unknown eNB Identity
10	PX_CELL_ID	Bitstring	Cell Identity
11	PX_TAC	Octetstring	The Tracking Area Code
12	PX_MME_GROUP_ID	Octetstring	The MME Group ID
13	PX_MME_CODE	Octetstring	The MME Code
14	PX_RELATIVE_MME_CAPACITY	Integer	The relative processing capacity of an MME
15	PX_MESSAGE_IDENTIFIER	Bitstring	The Message Identifier identifies a warning message
16	PX_SERIAL_NUMBER	Bitstring	The Serial Number to identify a particular message from the source
17	PX_REPETITION_PERIOD	Integer	The Repetition Period to indicate the periodicity of the warning message to be broadcast
18	PX_NUMBER_OF_BROADCASTS_REQUESTED	Integer	The Number of Broadcast Requested
19	PX_EMERGENCY_AREA_ID	octetstring	The Emergency Area ID used to indicate the area which has the emergency impact
20	PX_EVENT_TYPE	Enum	The Event Type
21	PX_REPORT_AREA	Enum	The Report Area
22	PX_EUTRAN_TRACE_ID	Octetstring	The E-UTRAN Trace ID
23	PX_INTERFACES_TO_TRACE	Enum	The interfaces to trace
24	PX_TRACE_DEPTH	Enum	PX_TRACE_DEPTH
25	PX_TRANSPORT_LAYER_ADDRESS	Bitstring	Transport Layer Address
26	PX_CDMA200_PDU	Octetstring	CDMA2000 message
27	PX_CDMA200_RAT_TYPE	Enum	CDMA2000 RAT type
28	PX_CDMA200_SECTOR_ID	Octetstring	CDMA2000 Reference Cell ID
29	PX_PAGING_DRX	Enum	The Paging DRX as defined in ETSI TS 136 304 [9]

Item	Identifier	Type	Description
30	PX_CSG_ID	Bitstring	Close Subscriber group as defined in ETSI TS 123 003 [10]
31	PX_UE_IDENTITY_INDEX_VALUE	Octetstring	The UE Identity Index value IE is used by the eNB to calculate the Paging Frame as defined in ETSI TS 136 304 [9]
32	PX_IMSI	Octetstring	The International Mobile Subscriber Identity, which is commonly used to identify the UE in the CN
33	PX_CNDOMAIN	Enum	Indicates whether Paging is originated from the CS or PS domain
34	PX_UNSUPPORTED_ENCRYPTION_ALGORITHM	Bitstring	Unsupported encryption algorithm ID
35	PX_ENCRYPTION_ALGORITHM	Bitstring	Encryption algorithm ID value
36	PX_INTEGRITY_PROTECTION_ALGORITHM	Bitstring	Integrity protection algorithm value
37	PX_PROCEURE_CODE	Integer	Procedure code value
38	PX_TRIGGERING_CODE	Enum	Triggering message code value
39	PX_CRITICALITY	Enum	Criticality value
40	PX_TPORT_LAYER_ADDR	Bitstring	Transport layer address value
41	PX_INVALID_TPORT_LAYER_ADDR	Bitstring	Invalid transport layer address value
42	PX_DL_GTP_TEID	Octetstring	Downlink GTP TEID
43	PX_SOURCE_TO_TARGET_TRANSPARENT_CONTAINER	Octetstring	Source to target transparent container value
44	PX_TARGET_TO_SOURCE_TRANSPARENT_CONTAINER	Octetstring	Target to source transparent container value

Annex B (normative):
S1AP S1-MME Abstract Test Suite (ATS)

B.1 The TTCN-3 Module

This ATS has been produced using the Testing and Test Control Notation (TTCN-3) according to ETSI ES 201 873-1 [8].

The TTCN-3 library modules corresponding to the ATS are contained in archive ts_10349703v010101p0.zip which accompanies the present document.

History

Document history		
V1.1.1	July 2017	Publication