



**Core Network and Interoperability Testing (INT);
NAS Conformance Testing for the S1-MME interface;
(3GPP™ Release 13);
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. 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).

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1 Scope

The present document provides the Test Suite Structure (TSS) and Test Purposes (TP) for the test specification for the NAS protocol on the S1-MME interface as specified in ETSI TS 124 301 [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 referenced document (including any amendments) applies.

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

- [1] ETSI TS 124 301 (V13.9.0): "Universal Mobile Telecommunications System (UMTS); LTE; Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3 (3GPP TS 24.301 version 13.9.0 Release 13)".
- [2] ETSI TS 103 530-1: "Core Network and Interoperability Testing (INT); NAS Conformance Testing for the S1-MME interface; (3GPP™ Release 13); 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] 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)".

2.2 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 ETSI TS 124 301 [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 124 301 [1] and the following apply:

MI	Message Information
NAS	Non-Access Stratum
S1AP	S1 Application Protocol
TP	Test Purpose
TSS	Test Suite Structure

4 Test configurations

4.1 Introduction

Test purposes of the present document address the VolTE functional entity MME that is accessible via the standardized S1-MME interface.

4.2 Test configuration using the S1-MME interface

The S1-MME interface is located between the eNB and the MME. The NAS messages are transparent for the eNB, therefore only the MME is considered a System Under test (SUT).

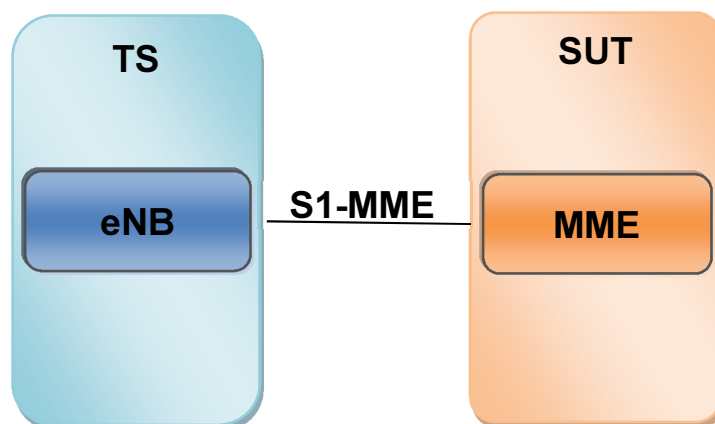


Figure 1: Test configuration CF_S1-MME

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 01, 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"
<interface or protocol>		Interface or protocol: NAS
<iut>	= type of IUT:	MME
<scope>	= group	MGR EMM / GUTI relocation procedure
		MAU EMM / Authentication procedure
		MSM EMM / Security mode control procedure
		MID EMM / Identification procedure
		MEI EMM / EMM information procedure
		MAT EMM / Attach procedure
		MDE EMM / Detach procedure
		MTA EMM / Tracking area updating procedure (S1 mode only)
		MSR EMM / Service request procedure
		MPA EMM / Paging procedure
		MTR EMM / Transport of NAS messages procedure
		MGT EMM / Generic transport of NAS messages procedure
		MES EMM / EMM Status
		SDF ESM / Default EPS bearer context activation procedure
		SDE ESM / Dedicated EPS bearer context activation procedure
		SCM ESM / EPS bearer context modification procedure
		SCD ESM / EPS bearer context deactivation procedure
		SPC ESM / UE requested PDN connectivity procedure
		SPD ESM / UE requested PDN disconnect procedure
		SRA ESM / UE requested bearer resource allocation procedure
		SRM ESM / UE requested bearer resource modification procedure
		SEI ESM / ESM information request procedure
		SNO ESM / Notification procedure
		SRR ESM / Remote UE Report procedure
		STU ESM / Transport of user data via the control plane procedure
<nn>	= sequential number	(01 to 99)

5.1.2 Test strategy

As the base specification in ETSI TS 124 301 [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 103 530-1 [2].

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. Table 2 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>	see table 1
	<clause number in base ETSI TS 124 301 [1] >	clause 8.2.1
	<PICS reference>	A.4/3
Summary	<i>Short free text description of the test objective</i>	Verify that the IUT can successfully process all mandatory IEs in an ATTACH REQUEST received due to attach procedure
Configuration	<i>Test configuration as described in clause 4.2</i>	CF_S1-MME
Initial condition (optional)	<i>Free text description of the condition that the IUT has reached before the test purpose applies</i>	
Start point	Ensure that the IUT in the	
	<i><state> see ETSI TS 124 301 [1] clause 8.1 and/or further actions before stimulus if the action is sending/receiving see below for message structure</i>	Network initiated detach procedure Having sent a DETACH REQUEST
Stimulus	<trigger> , see below for message structure	On receipt of an ATTACH REQUEST (see note 2)
	or <goal>	
Reaction	<action>	Sends, saves, does, etc.
	<i>if the action is sending see below for message structure <next action>, etc.</i>	
Message structure	<message type>	Message exchange, etc. (see note 2)
	a) containing a(n) <IE name> IE b) indicating <coding of the field> and back to a) or b) (see note 3)	
<p>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.</p> <p>NOTE 2: All messages are considered as "valid and compatible" unless otherwise specified in the test purpose. This includes the presence of all NAS mandatory IEs as specified in ETSI TS 124 301 [1]. For better overview of the document there are S1AP messages (ex. DOWNLINK_NAS_TRANSPORT) written with underscore character and NAS messages (ex. ATTACH REQUESTS) with space character.</p> <p>NOTE 3: An IE can be embedded into another IE. This is expressed by indentations, e.g. if Message1 contains IE1 and IE2 where IE1 has IE3 embedded this will be expressed like this:</p> <pre> sends/receives Message 1 containing IE1 containing IE3 indicating containing IE2 indicating.</pre>		

5.2 Test Purposes

5.2.1 PICS references

All PICS items referred in this clause are as specified in ETSI TS 103 530-1 [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.

5.2.2 S1_MME interface NAS – MME Role

5.2.2.1 Test selection

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

Test purposes contains S1AP message with NAS-PDU content. S1AP message content with required IEs is present within clause 5.2.3.

5.2.2.2 Elementary procedures for EPS mobility management

5.2.2.2.1 GUTI reallocation group

TP_NAS_MME_MGR_01	Standards Reference: ETSI TS 124 301 [1], clauses 5.4.1 and 8.2.16	PICS item: PICS A.4/1
Summary:	Verify that the IUT can send a GUTI REALLOCATION COMMAND message with all mandatory IEs to indicate GUTI reallocation procedure.	
Configuration:	CF_S1-MME	
Test purpose:	Ensure that the IUT to indicate a GUTI reallocation procedure, sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating GUTI REALLOCATION COMMAND containing an EPS_mobile_identity.	
Comments:		

5.2.2.2.2 Authentication group

TP_NAS_MME_MAU_01	Standards Reference: ETSI TS 124 301 [1], clauses 5.4.2 and 8.2.7	PICS item: PICS A.4/2
Summary:	Verify that the IUT can send an AUTHENTICATION REQUEST message with all mandatory IEs to indicate authentication procedure.	
Configuration:	CF_S1-MME	
Test purpose:	Ensure that the IUT to indicate an authentication procedure, sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REQUEST containing a NAS_key_set_identifier containing a Spare_half_octet containing an Authentication_parameter_RAND containing an Authentication_parameter_AUTN.	
Comments:	Preamble action: Attached procedure is exchanged.	

TP_NAS_MME_MAU_02	Standards Reference: ETSI TS 124 301 [1], clauses 5.4.2.2, 5.4.2.5 and 8.2.6	PICS item: PICS A.4/2.1
Summary:	Verify that the IUT can send an AUTHENTICATION REQUEST message to indicate authentication procedure and in case if authentication response is not valid and the IMSI was used for identification in the initial NAS message the IUT sends AUTHENTICATION REJECT message.	
Configuration:	CF_S1-MME	
Test purpose:	<p>Ensure that the IUT</p> <p>to indicate an authentication procedure, sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REQUEST containing a NAS_key_set_identifier containing a Spare_half_octet containing an Authentication_parameter_RAND containing an Authentication_parameter_AUTN</p> <p>on receipt of an UPLINK_NAS_TRANSPORT (see MI_S1AP_NAS_03) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION RESPONSE containing an Authentication_response_parameter indicating wrong response</p> <p>sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REJECT.</p>	
Comments:	Preamble action: Attached procedure is exchanged.	

TP_NAS_MME_MAU_03	Standards Reference: ETSI TS 124 301 [1], clauses 5.4.2.6 ¶ 3, 5.4.2.7 (item c), 8.2.7 and 8.2.18	PICS item: PICS A.4/2.2 and A.4/2.2.1
Summary:	Verify that the IUT can send an AUTHENTICATION REQUEST indicating invalid MAC code (in the AUTN parameter) and when receives AUTHENTICATION FAILURE the IUT sends IDENTITY REQUEST to obtain the IMSI from the UE. In case the identification procedure shows an incorrect GUTI/IMSI mapping the IUT sends new AUTHENTICATION REQUEST.	
Configuration:	CF_S1-MME	
Test purpose:	<p>Ensure that the IUT</p> <p>to indicate an authentication procedure, sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REQUEST containing a NAS_key_set_identifier containing a Spare_half_octet containing an Authentication_parameter_RAND containing an Authentication_parameter_AUTN indicating invalid AUTN code</p> <p>on receipt of an UPLINK_NAS_TRANSPORT (see MI_S1AP_NAS_03) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION FAILURE containing an EMM_cause indicating cause #20 "MAC failure"</p> <p>sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an IDENTITY REQUEST containing an Identity_type 2 indicating an IMSI containing a Spare_half_octet</p> <p>on receipt of an UPLINK_NAS_TRANSPORT (see MI_S1AP_NAS_03) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an IDENTITY RESPONSE containing a Mobile_identity indicating an incorrect IMSI</p> <p>sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REQUEST containing a NAS_key_set_identifier containing a Spare_half_octet containing an Authentication_parameter_RAND containing an Authentication_parameter_AUTN.</p>	
Comments:	Preamble action: Attached procedure is exchanged.	

TP_NAS_MME_MAU_04	Standards Reference: ETSI TS 124 301 [1], clauses 5.4.2.6 ¶ 3, 5.4.2.7 (item c), 8.2.6 and 8.2.18	PICS item: PICS A.4/2.2 and A.4/2.2.2
Summary:	Verify that the IUT can send an AUTHENTICATION REQUEST indicating invalid MAC code (in the AUTN parameter) and when receives AUTHENTICATION FAILURE the IUT sends IDENTITY REQUEST to obtain the IMSI from the UE. In case the identification procedure shows a correct GUTI/IMSI mapping the IUT sends AUTHENTICATION REJECT.	
Configuration:	CF_S1-MME	
Test purpose:	Ensure that the IUT to indicate an authentication procedure, sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REQUEST containing a NAS_key_set_identifier containing a Spare_half_octet containing an Authentication_parameter_RAND containing an Authentication_parameter_AUTN indicating invalid AUTN code on receipt of an UPLINK_NAS_TRANSPORT (see MI_S1AP_NAS_03) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION FAILURE containing an EMM_cause indicating cause #20 "MAC failure" sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an IDENTITY REQUEST containing an Identity_type 2 indicating an IMSI containing a Spare_half_octet on receipt of an UPLINK_NAS_TRANSPORT (see MI_S1AP_NAS_03) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an IDENTITY RESPONSE containing a Mobile_identity indicating an correct IMSI sends a DOWNLINK_NAS_TRANSPORT (see MI_S1AP_NAS_02) containing a NAS-PDU containing a Protocol_discriminator containing a Security_header_type containing a Message_type indicating an AUTHENTICATION REJECT .	
Comments:	Preamble action: Attached procedure is exchanged.	