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TECHNICAL SPECIFICATION

**Core Network and Interoperability Testing (INT);
S1AP Conformance Testing for the S1-MME interface;
(3GPP™ Release 13);
Part 2: Test Suite Structure (TSS) and Test Purposes (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

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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 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 [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.

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

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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] 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 123 203: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Policy and charging control architecture (3GPP TS 23.203)".

[7] ETSI TS 125 413: "Universal Mobile Telecommunications System (UMTS); UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling (3GPP TS 25.413)".

[8] ETSI TS 148 018: "Digital cellular telecommunications system (Phase 2+) (GSM); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS protocol (BSSGP) (3GPP TS 48.018)".

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.

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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 136 413 [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 136 413 [1] 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 VoLTE functional entities eNB and MME that are accessible via the standardized S1-MME interface.

4.2   Test configuration using the S1-MME interface

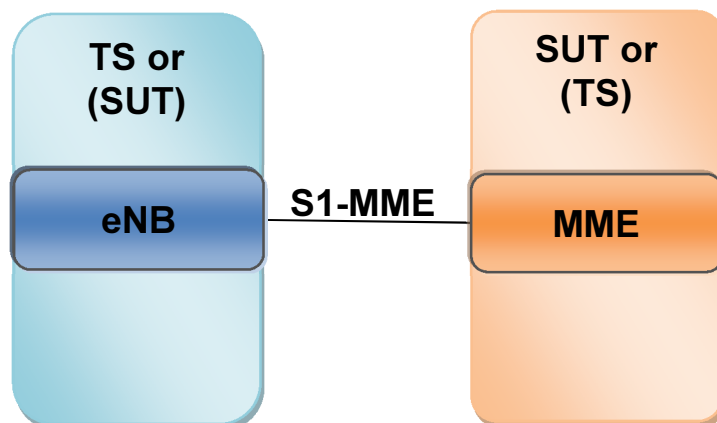The S1-MME interface is located between the eNB and the MME.
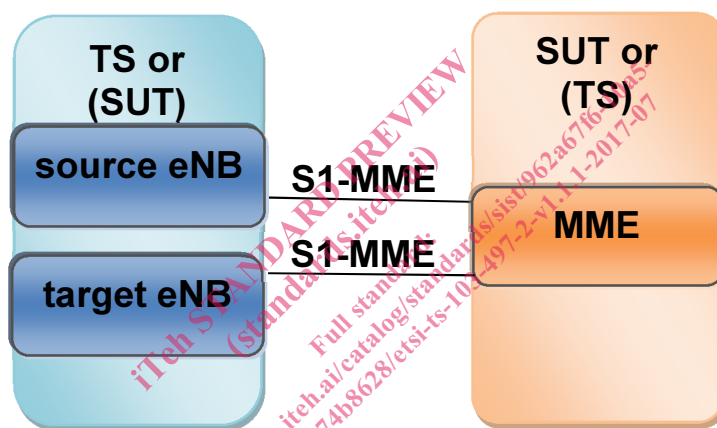
Figure 1: Test configuration CF_S1-MME

Figure 2: Test configuration CF_2S1-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:  S1AP
    <iut>       =    type of IUT:           ENB or MME
    <scope>       =  group                  RAB    E-RAB Management procedures
                                            CMP    Context Management procedures
                                            HAS    Handover Signalling
                                            PAG    Paging
                                            NAS    NAS transport
                                            MNP    Management procedures
                                            STP    S1 CDMA2000 Tunnelling Procedures
                                            UEC    UE Capability Info Indication
                                            TRP    Trace Procedures
                                            LRP    Location Reporting Procedures
                                            WTP    Warning Message Transmission Procedures
                                            EIT    eNB Direct Information Transfer
                                            MIT    MME Direct Information Transfer
                                            ECT    eNB Configuration Transfer
                                            MCT    MME Configuration Transfer
                                            LPP    LPPa transport
                                            ERR    Unknown, Unforseen and Erroneous Protocol Data

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

5.1.2 Test strategy

As the base specification in ETSI TS 136 413 [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 103 497-1 [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> <clause number in base ETSI TS 136 413 [1]> <PICS reference>	see Table 1 clause 8.2.1.1 A.2/3
Summary	*Short free text description of the test objective*	Verify that the IUT can successfully process all mandatory IEs in a E-RAB_SETUP_REQUEST received due to establishment-RAB management procedure.
Configuration	*Test configuration as described in clause 4.2*	CF_S1-MME
Initial condition (optional)	*Free text description of the condition that the IUT has reached before the test purpose applies.*	
Start point Stimulus	Ensure that the IUT in the <state> *see ETSI TS 136 413 [1], clause 8.1* *and/or further actions before stimulus* *if the action is sending/receiving* *see below for message structure* <trigger>, *see below for message structure* *or* <goal>.	Handover Preparation having sent a HANDOVER_REQUIRED on receipt of a HANDOVER_COMMAND (see note 2)
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) <IE name> IE (see note 4) b) indicating <coding of the field> and *back to a) or b) (see note 3)*	Message exchange, etc. (see note 2)
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 IEs as specified in ETSI TS 136 413 [1].	

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:
	sends/receives Message 1
	   containing IE1
	      containing IE3
	         indicating ...
	   containing IE2
	      indicating ...	

NOTE 4:	IE value fields used for e.g. identification or address should be equal in the scope of TP if not stated otherwise.	

5.2 Test Purposes

5.2.1 PICS references

All PICS items referred to in this clause are as specified in ETSI TS 103 497-1 [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

5.2.2.1 eNB Role

5.2.2.1.1 Test selection

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

5.2.2.1.2 E-RAB management group

TP_S1AP_ENB_RAB_01	Standards Reference: Clauses 8.2.1.2 (1st dashed line in 5th dashed list) and 9.1.3.1 and 9.1.3.2	PICS item: PICS A.3/1.1
Summary:	Verify that the IUT can successfully process all mandatory IEs in an E-RAB_SETUP_REQUEST received due to E-RAB management procedure and send E-RAB_SETUP_RESPONSE with successfully established E-RABs included in the E-RAB_Setup_List IE	
Configuration:	CF_S1-MME	

Test purpose:	Ensure that the IUT
	  on receipt of an E-RAB_SETUP_REQUEST
	    containing an MME_UE_S1AP_ID
	    containing an eNB_UE_S1AP_ID
	    containing an E-RAB_to_be_Setup_List
	      containing an E-RAB_to_be_Setup Item 1
	        containing an E-RAB_ID
	        containing an E-RAB_Level_QoS_Parameters
	          containing QCI
	            indicating value 5
	        containing a Transport_Layer_Address
	        containing a GTP-TEID
	        containing a NAS-PDU
	  sends an E-RAB_SETUP_RESPONSE
	    containing an MME_UE_S1AP_ID
	    containing an eNB_UE_S1AP_ID
	    containing an E-RAB_Setup_List
	      containing an E-RAB_Setup Item 1
	        containing an E-RAB_ID
	        containing a Transport_Layer_Address
	        containing a GTP-TEID	

Comments:		

TP_S1AP_ENB_RAB_02	Standards Reference: Clauses 8.2.1.2 (2nd dashed line in 5th dashed list) and 9.1.3.1 and 9.1.3.2	PICS item: PICS A.3/1.1
Summary:	Verify that the IUT after receiving an E-RAB_SETUP_REQUEST with failed E-RAB sends an E-RAB_SETUP_RESPONSE with E-RAB_Failed_to_Setup_List	
Configuration:	CF_S1-MME	

Test purpose:	Ensure that the IUT
	  on receipt of an E-RAB_SETUP_REQUEST
	    containing an MME_UE_S1AP_ID
	    containing an eNB_UE_S1AP_ID
	    containing an E-RAB_to_be_Setup_List
	      containing an E-RAB_to_be_Setup Item 1
	        containing an E-RAB_ID
	          indicating value A
	        containing an E-RAB_Level_QoS_Parameters
	        containing a Transport_Layer_Address
	        containing a GTP-TEID
	        containing a NAS-PDU
	      containing an E-RAB_to_be_Setup Item 2(not acceptable data for eNB)
	        containing an E-RAB_ID
	          indicating value B(different to value A)
	        containing an E-RAB_Level_QoS_Parameters
	          containing QCI
	            indicating not supported QCI value(255)
	        containing a Transport_Layer_Address
	        containing a GTP-TEID
	        containing a NAS-PDU
	  sends an E-RAB_SETUP_RESPONSE
	    containing an MME_UE_S1AP_ID
	    containing an eNB_UE_S1AP_ID
	    containing an E-RAB_Setup_List
	      containing an E-RAB_Setup Item 1
	        containing an E-RAB_ID
	          indicating value A
	        containing a Transport_Layer_Address
	        containing a GTP-TEID
	    containing an E-RAB_Failed_to_Setup_List
	      containing an E-RAB_List Item 1
	        containing an E-RAB_ID
	          indicating value B
	        containing a Cause
	          indicating 'not-supported-QCI-value'	

Comments:		

TP_S1AP_ENB_RAB_03	Standards Reference: Clauses 8.2.1.2 (3rd numbered list) and 9.1.3.1 and 9.1.3.2	PICS item: PICS A.3/1.1.1
Summary:	Verify that the IUT if it is interacted with handover preparation procedure sends E-RAB_SETUP_RESPONSE with appropriate cause value and continue with handover preparation procedure	
Configuration:	CF_S1-MME	

Test purpose:	Ensure that the IUT
	    on receipt of an E-RAB_SETUP_REQUEST
	        containing an MME_UE_S1AP_ID
	        containing an eNB_UE_S1AP_ID
	        containing an E-RAB_to_be_Setup_List
	            containing an E-RAB_to_be_Setup Item 1
	                containing an E-RAB_ID
	                containing an E-RAB_Level_QoS_Parameters
	                containing a Transport_Layer_Address
	                containing a GTP-TEID
	                containing a NAS-PDU
	    sends an E-RAB_SETUP_RESPONSE
	        containing an MME_UE_S1AP_ID
	        containing an eNB_UE_S1AP_ID
	        containing an E-RAB_Failed_to_Setup_List
	            containing an E-RAB_List Item 1
	                containing an E-RAB_ID
	                containing a Cause
	                    indicating 'S1 intra system Handover triggered' **or**
	                    indicating 'S1 inter system Handover triggered' **or**
	                    indicating 'X2 Handover triggered'
	    sends a HANDOVER_REQUIRED
	        containing an MME_UE_S1AP_ID
	        containing an eNB_UE_S1AP_ID
	        containing a Handover_Type
	            indicating LTEtoUTRAN
	        containing a Cause
	        containing a Target ID
	        containing a Source_to_Target_Transparent_Container
	            containing a Source RNC_to_Target RNC_Transparent_Container
	                indicating a UE History Information

Comments:	