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IMS Network Testing (INT); SS7 Message Transfer Part 2 - User Peer-to-Peer Adaptation Layer (M2PA); (IETF RFC 4165); Test Suite Structure and Test Purposes (TSS&TP) Conformance Testing

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Contents

Intellectual Property Rights	4
Foreword	4
1 Scope	5
2 References	5 5 5
 3 Definitions and abbreviations. 3.1 Definitions. 3.2 Abbreviations. 	5 6
 4 Test Suite Structure (TSS)	6 6 6 6 6 6
5 Test Purposes (TP)	7 7 7 7 8 8 8 8 9
5.2.1.3 inOpportune behaviour. 5.2.2 SCTP Usage. 5.2.2.1 Valid behaviour. 5.2.2.2 Invalid behaviour. 5.2.2.3 inOpportune behaviour. 5.2.3 Messaging.	10 10 11 12 12
5.2.3.1 Valid behaviour 5.2.3.2 Invalid behaviour 5.2.3.3 inOpportune Behaviour	12 14 14
History	16

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Foreword

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

1 Scope

The present document proposes a Test Suite Structure and Test Purposes (TSS&TP) for the SIGTRAN M2PA protocol as described in RFC 4165 [1], "Signalling System 7 (SS7) Message Transfer Part 2 (MTP2) User Peer-to-Peer Adaptation Layer (M2PA)".

5

2 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.

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

2.1 Normative references

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

- [1] IETF RFC 4165 (2005): "Signalling System 7 (SS7) Message Transfer Part 2 (MTP2) User Peerto-Peer Adaptation Layer".
- [2] ISO/IEC 9646-1: "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 1: General concepts".
- [3] ISO/IEC 9646-2: "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 2: Abstract Test Suite specification".
- [4] ISO/IEC 9646-3: "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 3: The Tree and Tabular Combined Notation (TTCN)".

2.2 Informative references

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 available.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in M2PA RFC 4165 [1], ISO/IEC 9646-1 [2], ISO/IEC 9646-2 [3], ISO/IEC 9646-3 [4] and the following apply:

inOpportune: tests that handle invalid signalling exchanges of messages, i.e. signalling messages that are properly structured and correctly encoded but are used out of sequence

invalid: tests that handle valid signalling exchanges of messages, which are either not properly structured or incorrectly encoded

Test Purpose (TP): non-formal high-level description of a test, mainly using text

NOTE: This test description can be used as the basis for a formal test specification (e.g. Abstract Test Suite in TTCN). See ISO/IEC 9646-2 [3] and ISO/IEC 9646-3 [4].

valid: tests that handle valid signalling exchanges of messages, which are properly structured and correctly encoded

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATS	Abstract Test Suite
Ι	Invalid
IPSP	IP Signalling Point
IUT	Implementation Under Test
MSG	MeSsaGing
0	InOpportune
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
SCTP	Stream Control Transmission Protocol
SG	Signalling Gateway
SUT	System Under Test
TSS	Test Suite Structure
V	Valid

4 Test Suite Structure (TSS)

4.1 Introduction

4.1.1 M2PA entities

Test Purposes have been written for M2PA Peers according to the M2PA RFC 4165 [1]. Two kinds of entities are considered as IUT:

- Signalling Gateways (SG).
- IP Signalling Points (IPSP).

Since the protocol usage is the same in both cases, no specific tests have been defined.

4.1.2 General assumptions

Test Purposes have been written for behaviours requested with "MUST" or that appear as obvious in present form. In addition test purposes have been defined for implementation dependent behaviour, where at least one of the implementation options is mandatory.

A more complete set of torture tests shall be provided.

4.1.3 System Under Test

SIGTRAN M2PA can be used by an IPSP or an SG. However, the protocol behaves the same.

4.2 Overview of the Test Suite Structure

The Test Suite Structures is based on the main functionalities as defined above.

Figure 1 shows the Test Suite Structure.

Last Sub groups may be subdivided in three subgroups: Valid behaviour (V), Invalid behaviour (I), inOpportune behaviour (O).

Test Suite	Main Functionalities	Test Group
M2PA	Link Alignment	V-I-O
	SCTP Usage	V
	Message Transfer	V-I

Figure 1: TSS for M2PA

5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP naming convention

Table 1: TP identifier naming convention scheme

Identifier: <protocol>_<main functionality="">_<type>_<nn></nn></type></main></protocol>	
<protocol></protocol>	M2PA
<main functionality=""></main>	ALGN (Link Alignment) SCTP (SCTP usage) MSG (MeSsaGing)
<type></type>	Valid behaviour (V) Invalid behaviour (I), inOpportune behaviour (O).
<nn></nn>	sequential number (01 to 99).

5.1.2 TP structure

Each test purpose is decomposed in six keywords:

- The **TPId** gives a unique identifier to each test purpose.
- The **Status** specifies whether the test purpose or the group is mandatory or optional according to RFC 4165 [1].
- The **Group Status** applies to all test purposes belonging to this group. Within the present document only test purposes that are mandatory have been defined.
- The **Precondition** determines the initial state of the SUT for the evaluating the test purpose.
- The **Reference** outlines the references in RFC 4165 [1] used to create the test purpose.
- The **Purpose** describes the objective of the test.

5.2.1 Link Alignment

5.2

5.2.1.1 Valid behaviour

TPId	M2PA_ALGN_V_01
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT initially sends a Link Status (Out of Service) message.
Comments	All header fields of the sent message should be verified.

TPId	M2PA_ALGN _V_02
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Out of Service) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of an Link Status (Out of Service) message,
	responds with a Link Status (Alignment) message.
Comments	All header fields of the sent message should be verified.

TPId	M2PA_ALGN_V_03
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message. The SUT is configured to perform
	a normal proving.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of a Link Status (Alignment) message, responds
	with a Link Status (Proving Normal) message.
Comments	All header fields of the sent message should be verified.

TPId	M2PA_ALGN_V_04
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message. The SUT is configured to perform
	an emergency proving.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of a Link Status (Alignment) message, responds
	with a Link Status (Proving Emergency) message.
Comments	All header fields of the sent message should be verified.

TPId	M2PA_ALGN_V_05
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Proving Normal) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of a Link Status (Proving Emergency) message,
	responds with a Link Status (Proving Emergency) message.
Comments	All header fields of the sent message should be verified.

TPId	M2PA_ALGN_V_06
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	The SUT is performing a normal proving.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, at the end of the proving period, sends a Link Status (Ready)
	message.
Comments	All header fields of the sent message should be verified.

M2PA_ALGN_V_07
Mandatory
Successfully established SCTP association between the SUT and the Tester.
The SUT is performing a emergency proving.
Section 4.1.3 [1]
Ensure that the IUT, at the end of the proving period, sends a Link Status (Ready)
message.
All header fields of the sent message should be verified.

5.2.1.2 Invalid behaviour

TPId	M2PA_ALGN _I_01
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Out of Service) message.
Reference	Section 2.1.3 [1]
Purpose	Ensure that the IUT, upon reception of an Link Status (Out of Service) message with
	a version field different from 1, does not respond with a Link Status (Alignment)
	message.
Comments	Not clearly specified by [1].

TPId	M2PA_ALGN _I_02
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Out of Service) message.
Reference	Section 2.1.2 [1]
Purpose	Ensure that the IUT, upon reception of an Link Status (Out of Service) message with
	a spare field different from 0, responds with a Link Status (Alignment) message.
Comments	

TPId	M2PA_ALGN _I_03
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Out of Service) message.
Reference	Section 2.1.3 [1]
	Section 4.2.1 [1]
Purpose	Ensure that the IUT, upon reception of an Link Status (Out of Service) message with
	a message class field different from 11, does not respond with a Link Status
	(Alignment) message.
Comments	The received message shall be discarded.

TPId	M2PA_ALGN_I_04
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a message with message type not equal to 1 or 2.
Reference	Section 2.1.4 [1]
	Section 4.2.1 [1]
Purpose	Ensure that the IUT, upon reception of a messge with invalid type, does not respond
	with a Link Status (Alignment) message.
Comments	The received message shall be discarded.

TPId	M2PA_ALGN _I_05
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Out of Service).
Reference	Section 2.1.5 [1]
Purpose	Ensure that the IUT, upon reception of an Link Status (Out of Service) message with a length field different from 20, does not respond with a Link Status (Alignment) message.
Comments	Not clearly specified by [1].

5.2.1.3 inOpportune behaviour

TPId	M2PA_ALGN_O_01
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of Link Status (Proving Normal) message,
	responds with a Link Status (Out of Service) message.
Comments	Not clearly specified by [1].

TPId	M2PA_ALGN_O_02
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of Link Status (Proving Emergency) message,
	responds with a Link Status (Out of Service) message.
Comments	Not clearly specified by [1].

TPId	M2PA_ALGN_O_03
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of Link Status (Ready) message, responds with
	a Link Status (Out of Service) message.
Comments	Not clearly specified by [1].

TPId	M2PA_ALGN_O_04
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of an empty User Data message, responds with
	a Link Status (Out of Service) message.
Comments	Not clearly specified by [1].

TPId	M2PA_ALGN_O_05
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
	SUT has sent a Link Status (Alignment) message.
Reference	Section 4.1.3 [1]
Purpose	Ensure that the IUT, upon reception of a non-empty User Data message, responds
	with a Link Status (Out of Service) message.
Comments	Not clearly specified by [1].

5.2.2 SCTP Usage

5.2.2.1 Valid behaviour

TPId	M2PA_SCTP_V_01
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
Reference	Section 1.7.3 [1]
	Section 4.1.2 [1]
Purpose	Ensure that the SCTP association has at least 2 streams in each direction.
Comments	

TPId	M2PA_SCTP_V_02
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is the ready state.
Reference	Section 4.1.6 [1]
Purpose	Ensure that the SCTP is not terminated by the SUT after the Tester sends a Link
	Status (Out of Service) message.
Comments	

TPId	M2PA_SCTP_V_03
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the IUT sends Link Status messages on the SCTP stream 0 during alignment.
Comments	

TPId	M2PA_SCTP_V_04
Status	Optional
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the IUT sends the Link Status (Busy) message and Link Status (Busy
	Ended) message on the SCTP stream 0.
Comments	

TPId	M2PA_SCTP_V_05
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The M2PA connection is in the ready state. The SUT experiences a remote processor outage.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the IUT sends the Link Status (Ready) message at the end of processor outage on the SCTP stream 1.
Comments	

TPId	M2PA_SCTP_V_06
Status	Optional
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The M2PA connection is in the ready state. The SUT experiences a local processor outage.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the IUT sends the Link Status (Processor Outage) message and the Link Status (Processor Recovered) message as well as the Link Status (Ready) message at the end of processor outage on the SCTP stream 1.
Comments	

TPId	M2PA_SCTP_V_07
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The M2PA connection is in the ready state.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the IUT sends User Data messages on the SCTP stream 1.
Comments	

5.2.2.2 Invalid behaviour

Void.

5.2.2.3 inOpportune behaviour

Void.

5.2.3 Messaging

5.2.3.1 Valid behaviour

TPId	M2PA_MSG_V_01
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the SUT takes the link out of service when T7 runs off.
Comments	

TPId	M2PA MSG V 02
01-1	
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the SUT stops T7 when it receives an acknowledgement using a non-
	empty User Data message.
Comments	

TDIA	
I Pid	MIZPA_MISG_V_03
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.2,1 [1]
Purpose	Ensure that the SUT stops T7 when it receives an acknowledgement using an empty
	User Data message.
Comments	

TPId	M2PA_MSG_V_04
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the SUT is able to acknowledge a received non-empty User Data message with a non-empty User Data message.
Comments	

TPId	M2PA_MSG_V_05
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.2.1 [1]
Purpose	Ensure that the SUT is able to acknowledge a received non-empty User Data
	message with an empty User Data message.
Comments	

TPId	M2PA_MSG_V_06
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.1.5 [1]
Purpose	Ensure that the SUT, upon reception of a Link Status (Busy) message, does not send
	non-empty User Data messages.
Comments	

TPId	M2PA_MSG_V_07
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The
	M2PA connection is in the ready state.
Reference	Section 4.1.5 [1]
Purpose	Ensure that the SUT, upon reception of a Link Status (Busy) message, does continue to send empty User Data messages for acknowledging received non-empty User Data messages.
Comments	

TPId	M2PA_MSG_V_08
Status	Mandatory
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The M2PA connection is in the ready state.
Reference	Section 4.1.5 [1]
Purpose	Ensure that the SUT, upon reception of a Link Status (Busy Ended) message, does resume sending non-empty User Data messages.
Comments	

TPId	M2PA_MSG_V_09			
Status	Mandatory			
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The			
	M2PA connection is in the ready state.			
Reference	Section 4.1.5 [1]			
Purpose	Ensure that the SUT, upon reception of a Link Status (Busy) message, does take the			
	link out of service, if the busy state persits longer than T6.			
Comments				

TPId	M2PA_MSG_V_10			
Status	Mandatory			
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The			
	M2PA connection is in the ready state.			
Reference	Section 4.1.4 [1]			
Purpose	Ensure that the SUT, upon reception of a Link Status (Processor Outage) message,			
	does not send non-empty User Data messages.			
Comments				

TPId	M2PA_MSG_V_11			
Status	Mandatory			
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The			
	M2PA connection is in the ready state.			
Reference	Section 4.1.4 [1]			
Purpose	Ensure that the SUT, upon reception of a Link Status (Processor Outage) message, does continue to send empty User Data messages for acknowledging received non-empty User Data messages.			
Comments				

TPId	M2PA_MSG_V_12			
Status	Mandatory			
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The			
	M2PA connection is in the ready state.			
Reference	Section 4.1.4 [1]			
Purpose	Ensure that the SUT, upon reception of a Link Status (Processor Recovered)			
	message, sends a Link Status (Ready) message.			
Comments				

TPId	M2PA_MSG_V_13		
Status	Mandatory		
Pre-condition	Successfully established SCTP association between the SUT and the Tester. The		
	M2PA connection is in the ready state.		
Reference	Section 4.1.4 [1]		
Purpose	Ensure that the SUT, upon reception of a Link Status (Processor Recovered)		
	message, sends a Link Status (Ready) message and resumes to send non-empty		
	User Data messages.		
Comments			

5.2.3.2 Invalid behaviour

TPId	M2PA_MSG _I_01			
Status	Mandatory			
Pre-condition	Successfully established SCTP association between the SUT and the Tester.			
	The M2PA connection is in the ready state.			
Reference	Section 2.1.3 [1]			
Purpose	Ensure that the IUT, upon reception of a non-empty User Data mesage with a version field different from 1, does not acknowledge it.			
Comments	Not clearly specified by [1].			

TPId	M2PA_MSG _I_02		
Status	Mandatory		
Pre-condition	Successfully established SCTP association between the SUT and the Tester.		
	The M2PA connection is in the ready state.		
Reference	Section 2.1.2 [1]		
Purpose	Ensure that the IUT, upon reception of a non-empty User Data message with a spare		
	field different from 0, acknowledges it.		
Comments			

TPId	M2PA_MSG _I_03			
Status	Mandatory			
Pre-condition	Successfully established SCTP association between the SUT and the Tester.			
	The M2PA connection is in the ready state.			
Reference	Section 2.1.3 [1]			
	Section 4.2.1 [1]			
Purpose	Ensure that the IUT, upon reception of a non-empty User Data message with a			
	message class field different from 11, does not acknowledge it.			
Comments	The received message shall be discarded.			

TPId	M2PA_MSG _I_04		
Status	Mandatory		
Pre-condition	Successfully established SCTP association between the SUT and the Tester.		
	The M2PA connection is in the ready state.		
Reference	Section 2.1.5 [1]		
Purpose	Ensure that the IUT, upon reception of a non-empty User Data message with a length		
	field different from the correct length, does not acknowledge it.		
Comments	Not clearly specified by [1].		

5.2.3.3 inOpportune Behaviour

Void.

Annex A (informative): Bibliography

• ETSI TS 102 142: "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Message of SS7 over IP); Message transfer part 3 User Adaptation layer (M3UA) [Endorsement of RFC 3332 (2002), modified]".

15

History

Document history		
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16