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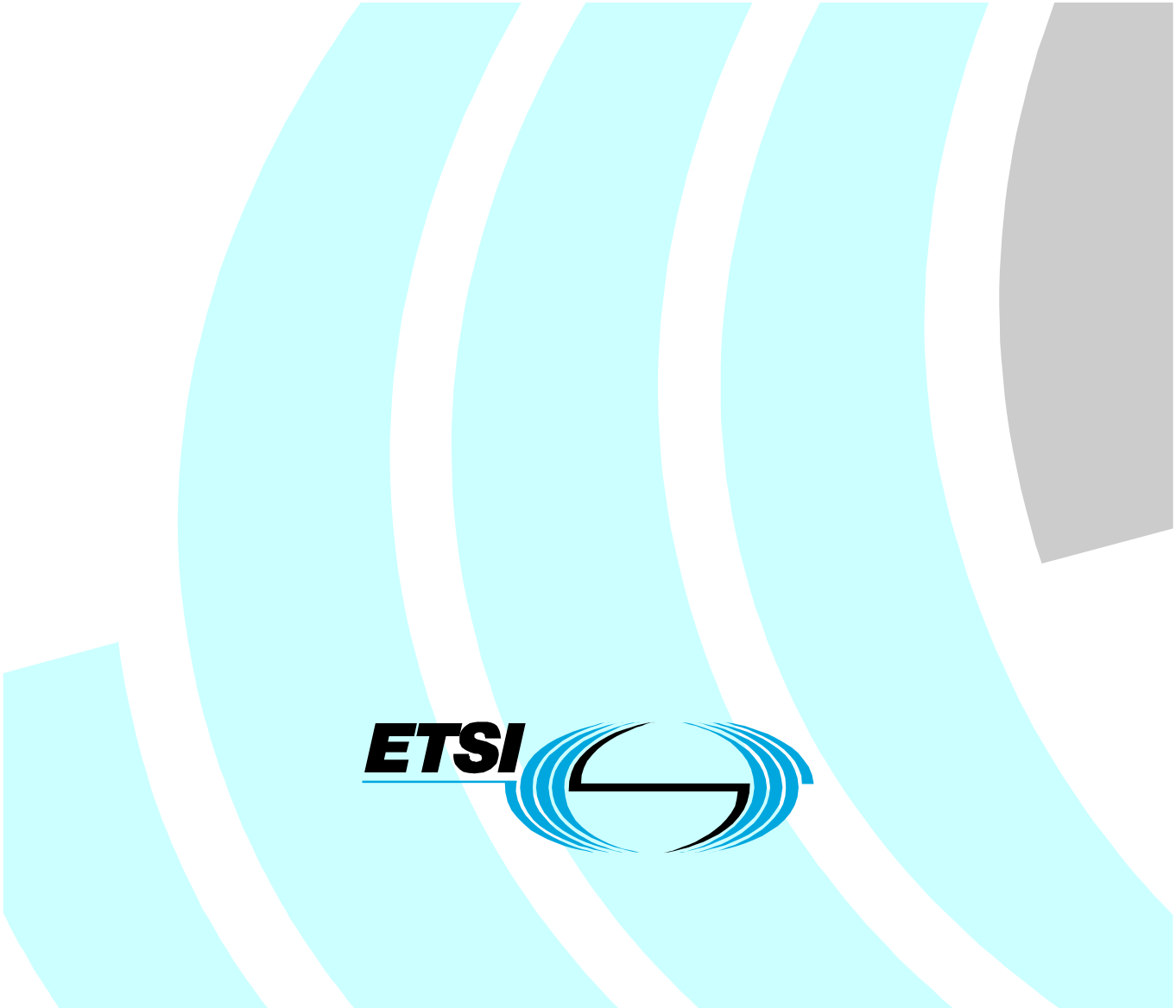
Technical Specification

Methods for Testing and Specification (MTS); SS7 Message Transfer Part 2 - User Adaptation Layer (M2UA); Test Suite Structure and Test Purposes (TSS&TP)



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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Methods for Testing and Specification (MTS).

To evaluate conformance of a particular implementation, it is necessary to have a set of test purposes to evaluate the dynamic behaviour of the Implementation Under Test (IUT). The specification containing those test purposes is called a Test Suite Structure and Test Purposes (TSS&TP) specification.

1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS&TP) specification for the M2UA signalling defined in TS 102 141 [1] in compliance with the relevant requirements, and in accordance with the relevant guidance given in ISO/IEC 9646-2 [4] and ETS 300 406 [5].

In the present document the test cases are divided into different categories. These categories are as follows:

- Valid behaviour tests: Tests that handle valid signalling exchanges of messages, i.e. signalling messages that are properly structured and correctly encoded and are used in the correct sequence.
- Inopportune behaviour tests: 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 behaviour tests: This test sub-group is intended to verify that the Implementation Under Test (IUT) is able to react properly having received an invalid Protocol Data Unit (PDU).

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

[1] ETSI TS 102 141: "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Transport of SS7 over IP); Message transfer part 2 User Adaptation layer (M2UA); [Endorsement of RFC 3331 (2002), modified]".

[2] IETF RFC 3331 (September 2002): "Signaling System 7 (SS7) Message Transfer Part 2 (MTP2) - User Adaptation Layer".

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

[4] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 102 141 [1], ISO/IEC 9646-1 [3], ISO/IEC 9646-2 [4] and the following apply:

abstract test case: Refer to ISO/IEC 9646-1 [3].

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].

Lower Tester (LT): Refer to ISO/IEC 9646-1 [3].

Implementation Conformance Statement (ICS): Refer to ISO/IEC 9646-1 [3].

ICS proforma: Refer to ISO/IEC 9646-1 [3].

Implementation eXtra Information for Testing (IXIT): Refer to ISO/IEC 9646-1 [3].

IXIT proforma: Refer to ISO/IEC 9646-1 [3].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [3].

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

Inoportune behaviour test purpose: tests that handle valid signalling exchanges of messages, which are properly structured and correctly encoded but are received when not expected

Invalid behaviour test purpose: tests that handle valid signalling exchanges of messages, which are not properly structured or incorrectly encoded

3.2 Abbreviations

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

AS	Application Server
ASP	Application Server Process
ATM	Abstract Test Method
ATS	Abstract Test Suite
CCS	Common Channel Signalling
IID	Interface IDentifier
IO	InOpportune behaviour
IUT	Implementation Under Test
IV	InValid behaviour
LT	Lower Tester
M2UA	Message transfer part 2 User Adaptation layer
MGC	Media Gateway Control
MTP	Message Transfer Part
NIF	Nodal Inter-working Function
SCTP	Stream Control Transmission Protocol
SEP	Signalling End Point
SG	Signalling Gateway
SGP	Signaling Gateway Process
SLT	Signalling Link Terminal

SS7	Signalling System No. 7
STP	Signalling Transfer Point
TSS	Test Suite Structure
V	Valid behaviour

4 Test Suite Structure (TSS)

4.1 Introduction

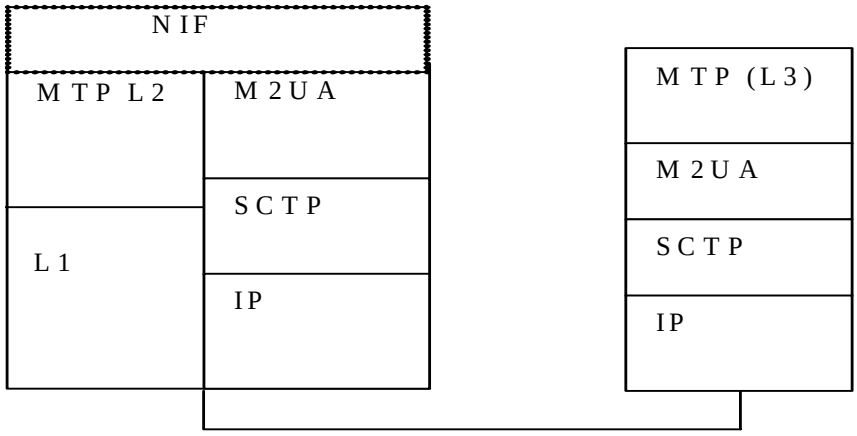
4.1.1 M2UA Entities

Test Purposes have been written for M2UA Peers according to TS 102 141 [1].

Two kinds of entities are considered successively as IUT:

- Signalling Gateway Process (SGP);
- Application Server Process (ASP).

In a Signalling Gateway, it is expected that the SS7 Signalling is received over a standard SS7 network termination, using the SS7 Message Transfer Part (MTP) to provide transport of SS7 Signalling messages to and from an SS7 Signalling End Point (SEP) or SS7 Signalling Transfer Point (STP). In other words, the SG acts as a Signalling Link Terminal (SLT). The SG then provides an interworking of transport functions with IP Signalling Transport, in order to transport the MTP3 signalling messages to the network element (e.g. an MGC) actings as Application Server (AS) where the peer MTP3 protocol layer exists, as shown below:



NOTE 1: NIF - Nodal Interworking Function

NOTE 2: P - Internet Protocol

NOTE 3: SCTP - Stream Control Transmission Protocol

Figure 1: Embedding of M2UA protocol stack in the SGP and ASP

To enable the verification of certain aspects of the protocol, certain optional test purposes will require the use of multiple ASPs within an AS.

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.

4.2 Overview of the Test Suite Structure

The following figure shows the Test Suite Structure (TSS).

Functionality subgroups may be subdivided in three subgroups:

- Valid behaviour (V);
- Inopportune behaviour (IO);
- Invalid behaviour (IV).

Table 1: TSS for M2UA

Test suite	Main functionalities	Functionality subgroup	Test group
M2UA	Signalling Gateway Process (SGP)	State and traffic transactions (ASPM)	V-IO-IV
		Interface identifier Management (IIM)	V-IO-IV
		M2UA User Adaptation Messages (MAUP)	V-IO-IV
	Application Server Process (ASP)	State and traffic transactions (ASPM)	V-IO-IV
		Interface identifier Management (IIM)	V-IO-IV
		M2UA User Adaptation Messages (MAUP)	V-IO-IV
	General Error Handling (GEH)	-	-

4.3 Conformance Test Cases

This clause describes the test steps and the message flows corresponding to the test cases.

The test cases are broadly divided into a number of different groups according to the protocol functionality.

- **State and traffic transactions (ASPM):** This group validates the ASP / SG state and traffic transaction messages.
- **Interface identifier Management (IIM):** The dynamic registration and de-registration procedures are covered in this section.
- **M2UA User Adaptation Messages (MAUP):** MTP2 user adaptation procedures are covered in this section.

Each group is further categorized based on the test case configuration of the IUT i.e. whether ASP or SG of M2UA layer is under test.

Then the group has the normal category of valid, inopportune and invalid behaviour tests.

A further group has been added to cover the error handling procedures in a general manner.

5 Test Purposes (TP)

5.1 Introduction

For each test requirement a TP is defined.

5.1.1 TP naming convention

TPs are numbered, starting at 01, within each group. Groups are organized according to the TSS. Additional references are added to identify the actual test suite (see table 2).

Table 2: TP identifier naming convention scheme

Identifier: <protocol>_<device under test>_<main functionality>_<type>_<nn>	
<protocol>	M2UA
<device under test>	SGP (Signalling Gateway Process) ASP (Application Server Process) GEH. (General Error Handling)
<main functionality>	ASPM (ASP Maintenance Procedures) IIM (Interface Identifier MGMT Messaging) M2UA User Adaptation Messages (MAUP)
<type>	Valid Behaviour (V) Inopportune Behaviour (IO), Invalid Behaviour (IV)
<nn>	sequential number (01 to 99).

5.1.2 Source of TP definition

The TPs are based on TS 102 141 [1].

5.1.3 Test strategy

As the base standard TS 102 141 [1] contains no explicit requirements for testing, the TPs were generated as a result of an analysis of the base standard.

The TPs are only based on conformance requirements related to the externally observable behaviour of the IUT and are limited to conceivable situations to which a real implementation is likely to be faced (see ETS 300 406 [5]).

5.1.4 TP structure

Each test purpose is decomposed in five 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 3331 [2].
- The **Test Configuration** of the IUT within the test architecture.
- The **Precondition** determines the initial state of the SUT for the evaluating the test purpose.
- The **Ref**. outlines the references in RFC 3331 [2] used to create the test purpose.
- The **Purpose** describes the objective of the test.

5.2 Test Purposes for Signalling Gateway Process (SGP)

5.2.1 ASPM STATE and Traffic Transactions Management

5.2.1.1 Valid Behaviour Test Cases

TPId:	**M2UA_SGP_ASPM_V_01**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in down state.
Ref:	Sections 3.3.2.1, 4.3.1, 4.3.2 and 4.3.4.5 of RFC 3331 [2]
Purpose:	To validate that the ASP Up message received with mandatory and optional parameters, moves the state of the ASP and AS to Inactive at the IUT. Ensure that the IUT responds with the ASP Up Ack and Notify (AS-Inactive) message indicating the AS state has been changed to inactive.

TPId:	**M2UA_SGP_ASPM_V_02**
Status:	Optional
Test Configuration	Single ASP is configured in two different AS. If necessary the ASs and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP associations are established between ASP and IUT. ASP is in down state.
Ref:	Sections 4.3.4.1, 4.3.1, 4.3.2 and 4.3.4.5 of RFC 3331 [2]
Purpose:	To ensure that, upon reception of the ASP Up message, IUT responds with ASP Up Ack and 2 Notify (AS-Inactive) messages corresponding to each AS.

TPId:	**M2UA _SGP_ASP_V_03**
Status:	Optional
Test Configuration	Two ASPs (ASP1 and ASP2) are configured in a single AS. If necessary the AS and ASPs have to be pre-configured at the IUT.
Pre-Condition	SCTP associations are established between IUT and both ASPs. Both ASPs are in down state.
Ref:	Sections 4.3.4.1, 4.3.1, 4.3.2 and 4.3.4.5 of RFC 3331 [2]
Purpose:	Validate that when IUT receives an ASP Up message for ASP1, it responds with ASP Up Ack and a Notify (AS-Inactive) message, indicating the AS state has moved to inactive. It should be verified that no Notify message is sent to the ASP that has not yet sent the ASP Up message. Now send the ASP Up message for ASP2 and validate that the IUT responds with ASP Up Ack message only.

TPId:	**M2UA_SGP_ASPM_V_04**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. AS is in inactive state.
Ref:	Sections 3.3.2.7, 3.3.2.8 and 4.3.4.3 of RFC 3331 [2]
Purpose:	To validate the ASP Active message having all parameters and one configured IID (using tag of 0x1), moves the state of the ASP to active. Ensure that the IUT responds with the ASP Active Ack and a Notify (AS-Active) message to indicate that the AS state has moved to the active. If the ASP was pre-configured to serve more than one IID, the ASP Active Ack message should contain all pre-configured IID's and not only the one contained in the ASP Active message.

TPId:	M2UA_SGP_ASPM_V_05
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.2.7 and 4.3.4.3 of RFC 3331 [2]
Purpose:	To validate the ASP Active message having all parameters and multiple configured IID (using tag of 0x1), moves the state of the ASP to active. Ensure that the IUT responds with the ASP Active Ack and a Notify (AS-Active) message to indicate the AS state has moved to the active.

TPId:	M2UA_SGP_ASPM_V_06
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.2.7 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that an on reception of an ASP Active message with integer range parameters with configured start and stop values (tag of 0x8) from peer, IUT responds with the ASP Active Ack and a Notify (AS-Active) message having the value of (AS_active) in status type field.

TPId:	M2UA_SGP_ASPM_V_07
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Sections 3.3.2.9, 4.3.2 and 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that upon reception of an ASP Inactive message, IUT responds with ASP Inactive Ack message and one or more Notify messages depending whether the IUT has T(r) implemented or not.

TPId:	M2UA_SGP_ASPM_V_08
Status:	Optional
Test Configuration	Single ASP is configured in two different AS. If necessary the ASs and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state in both AS1 and AS2.
Ref:	Sections 3.3.2.8 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with one or two ASP Active Ack and one or two Notify (AS Active) messages, indicating the AS state transaction to active in both AS, upon receiving an ASP Active message with only the mandatory parameters.

TPId:	M2UA_SGP_ASPM_V_09
Status:	Optional
Test Configuration	Single ASP is configured in two different AS. If necessary the ASs and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state in both AS1 and AS2.
Ref:	Sections 3.3.2.8 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an ASP Active Ack and Notify (AS Active) messages indicating the AS1 state transaction to active, when it receives an ASP Active message with IID values as that of AS1. Also, validate that on receiving an ASP Active message with IID as configured for AS2, IUT responds with the ASP Active Ack and Notify (AS-Active) message.

TPId:	M2UA_SGP_ASPM_V_10
Status:	Optional
Test Configuration	Single ASP is configured in two different AS. If necessary the ASs and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state in both AS.
Ref:	Sections 3.3.2.10 and 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with one or two ASP Inactive Ack and two Notify (AS Pending) messages indicating the AS state transaction to inactive in both AS, when it receives an ASP Inactive message.The IUT might send another Notify (AS-Inactive) message depending whether the IUT has T(r) implemented or not.

TPId:	M2UA_SGP_ASPM_V_11
Status:	Optional
Test Configuration	Single ASP is configured in two different AS. If necessary the ASs and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state in both AS1 and AS2.
Ref:	Sections 3.3.2.10 and 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an ASP Inactive Ack and a Notify (AS Pending) message indicating the AS1 state transaction to inactive, when it receives an ASP Inactive message with IID values as configured for AS1. Also, validate that on receiving an ASP Inactive message with IID as configured for AS2, IUT responds with the ASP Inactive Ack and Notify (AS-Pending) message.The IUT might send another Notify (AS-Inactive) message depending whether the IUT has T(r) implemented or not.

TPId:	M2UA_SGP_ASPM_V_12
Status:	Optional
Test Configuration	Two ASPs are configured in the same AS. If necessary the AS and ASPs have to be pre-configured at the IUT. AS is configured in Load-share mode.
Pre-Condition	SCTP associations are established between the IUT and both ASPs. ASP1 and ASP2 are in inactive state in AS.
Ref:	Sections 3.3.2.7 and 4.3.4.3 of RFC 3331 [2]
Purpose:	To ensure that the IUT upon reception of an ASP Active message having at least as one of the optional parameters a range of configured IIDs (using tag 0x8), responds with an ASP Active Ack message and a Notify (AS-Active) message to indicate the AS state has moved to active state.

TPId:	M2UA_SGP_ASPM_V_13
Status:	Optional
Test Configuration	Two ASPs are configured in the same AS. If necessary the AS and ASPs have to be pre-configured at the IUT. AS is configured in Override mode.
Pre-Condition	SCTP associations are established between the IUT and both ASPs. ASP1 is in active state and ASP2 is in inactive state in the AS.
Ref:	Sections 3.3.2.7 and 4.3.4.3 of RFC 3331 [2]
Purpose:	To validate the ASP Active message having configured IID for ASP2, moves the state of the ASP2 to active at IUT. Ensure that the IUT responds with the ASP Active Ack and a Notify (Alternate ASP Active) to ASP1 indicating that alternate resource has become active.

TPId:	M2UA_SGP_ASPM_V_14
Status:	Optional NOTE: This test is not relevant for an IUT implemented according to TS 102 141 [1], as this document does not of specify a minimum number of ASPs to be active before an AS is considered active.
Test Configuration	Two ASPs are configured in an AS. If necessary the AS and ASPs have to be pre-configured at the IUT. AS is configured in load sharing mode and minimum two ASPs are required to handle traffic.
Pre-Condition	SCTP associations are established between the IUT and both ASPs. Both of the ASP's are in active state.
Ref:	Sections 3.3.3.2, 4.3.4.3 and 4.3.4.5 of RFC 3331 [2]
Purpose:	Validate that the IUT sends Notify (Insufficient ASP resources active in AS) message to the ASP1 indicating that the number of ASPs required to handle traffic is not sufficient, when it receives an ASP Inactive message for ASP2. Ensure that the IUT responds with an ASP Inactive Ack message.

TPId:	M2UA_SGP_ASPM_V_15
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT.
Ref:	Sections 3.3.2.5, 3.3.2.6 and 4.3.4.6 of RFC 3331 [2]
Purpose:	Validate that the IUT responds with a Heartbeat Ack message, when it receives a Heartbeat message. Ensure that Heartbeat Ack is sent by the IUT with same heartbeat data provided in the Heartbeat message.

5.2.1.2 Inopportune Behaviour Test Cases

TPId:	M2UA_SGP_ASPM_IO_01
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Section 4.3.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an ASP Up Ack message, when it receives an ASP Up message, even though the ASP state is ASP-Inactive.

TPId:	M2UA_SGP_ASPM_IO_02
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.3.1 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT on receipt of a Data message discards the message. An IUT according to ETSI TS 102 141 [1]might respond with an Error message.

TPId:	M2UA_SGP_ASPM_IO_03
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Section 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an ASP Active Acknowledge message, when it receives an ASP Active message, even though the ASP state is ASP active.

TPId:	M2UA_SGP_ASPM_IO_04
Status:	Optional
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Section 4.3.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an ASP Up Ack message and an Error message with error code as "Unexpected Messsage", when it receives the ASP Up message in ASP active state.

5.2.1.3 Invalid Behaviour Test Cases

TPId:	M2UA_SGP_ASPM_IV_01
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in down state.
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message indicating "invalid version", when it receives an ASP Up message with a value other than "1" in the version field of the common message header.

TPId:	M2UA_SGP_ASPM_IV_02
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Sections 3.1.3 and 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with error code as "Unsupported Message Class", when it receives a message having unsupported message class value (message class not marked for M2UA).

TPId:	M2UA_SGP_ASPM_IV_03
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Sections 3.1.4 and 8.2.2 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with error code as "Unsupported Message Type", when it receives a message having message type value as reserved.

TPId:	M2UA_SGP_ASPM_IV_04
Status:	Optional
Test Configuration	Two ASPs are configured in the same AS. If necessary the AS and ASPs have to be pre-configured at the IUT. AS is configured in Load-share mode.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.2.7 and 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with error code as "Unsupported Traffic Handling Mode", when it receives an ASP Active message having traffic handling mode as Override.

TPId:	M2UA_SGP_ASPM_IV_05
Status:	Optional
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with error code as "Invalid Stream Identifier", when it receives an ASP Active message on a streamother than 0.

TPId:	M2UA_SGP_ASPM_IV_06
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.2.7 and 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with error code as "Invalid Interface Identifier", when it receives an ASP Active message having non-configured IIDs. To verify that the SG sends an Error message Invalid interface identifier if the ASP sends a message with an non-configured interface identifier value.

TPId:	M2UA_SGP_ASPM_IV_07
Status:	Optional
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT. The IUT requires the use of the optional ASP Identifier.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in down state.
Ref:	Sections 3.3.2.1 and 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with reason "ASP Identifer Required", when it receives an ASP Up message without an ASP Identifier parameter.

TPId:	M2UA_SGP_ASPM_IV_08
Status:	Optional
Test Configuration	One ASP is configured in an AS. If necessary the AS and ASP have to be pre-configured at the IUT. The IUT requires the use of the optional ASP Identifier.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in down state.
Ref:	Sections 3.3.2.1 and 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with reason "Invalid ASP Identifer", when it receives an ASP Up message with a non-unique ASP Identifier.

5.2.2 Interface Identifier MGMT (IIM) Messages

NOTE: The tests for IIM messages are not relevant for an IUT implemented according to TS 102 141 [1], as this document does not permit the use of IIM messages. A pure RFC 3331 [2] implementation should be tested according to the test purposes in this section.

5.2.2.1 Valid Behaviour Test cases

TPId:	**M2UA_SGP_IIM_V_01**
Status:	Optional
Test Configuration	ASP is not yet configured in any AS at IUT.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT responds with Registration Response message having status field value as "Successfully Registered", when it receives a Registration Request message with Link key parameters defined with Local-LK-Identifier, Signalling Data Terminal Identifier and Signalling Data Link Identifier values.

TPId:	**M2UA_SGP_IIM_V_02**
Status:	Optional
Test Configuration	ASP is configured in single AS
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in inactive state.
Ref:	Sections 3.3.4.3, 3.3.4.4 and 4.4.2 of RFC 3331 [2]
Purpose:	Ensure that IUT sends a Deregistration Response with status field as "Successfully De-registered", on receiving a Deregistration Request message with the configured IID values.

TPId:	**M2UA_SGP_IIM_V_03**
Status:	Optional
Test Configuration	ASP1 is configured in an AS ASP2 is not yet configured in any AS.
Pre-Condition	SCTP associations are established between the IUT and both ASPs. ASP1 is in active state and ASP2 is in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that on reception of a Registration Request message from ASP2 to IUT with Link key having parameters as that of configured AS, responds with the Registration Response message.

TPId:	**M2UA_SGP_IIM_V_04**
Status:	Optional
Test Configuration	ASP1 and ASP2 are configured in an AS.
Pre-Condition	SCTP associations are established between the IUT and both ASPs. ASP1 and ASP2 are in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that upon reception of a Deregistration Request Message from ASP1 with configured IID, IUT responds with the Deregistration Response message with status field as "De-registration Successful".

TPId:	**M2UA_SGP_IIM_V_05**
Status:	Optional
Test Configuration	ASP1 and ASP2 are configured in the same AS.
Pre-Condition	SCTP associations are established between the IUT and both ASPs. All ASPs are in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that upon reception of a Deregistration Request Message from ASP1 with configured IID, IUT responds with the Deregistration Response message with status field as "De-registration Successful". Also, valdiate that the IUT responds with the Deregistration Response message having status field as "De-registration Successful" and deletes the AS, even when it receives a Deregistration Request message from ASP2 with configured IID.

5.2.2.2 Inopportune Behaviour Test cases

TPId:	**M2UA_SGP_IIM_IO_01**
Status:	Optional
Test Configuration	ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in Active state.
Ref:	Section 3.3.3.1 RFC 3331 [2]
Purpose:	Ensure that the IUT responds with an Error message with error code as "ASP Currently Active for Interface Identifier", when it receives a Deregistration Request for an ASP in active state.

5.2.2.3 Invalid Behaviour Test Cases

No test requirements identified.

5.2.3 MTP2 User Adaptation Messages

5.2.3.1 Valid Behaviour Test cases

TPId:	**M2UA_SGP_MAUP_V_01**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Section 3.3.1.3 of RFC 3331 [2]
Purpose:	Ensure that IUT sends an Establish Confirm message, when it receives an Establish Request message with configured IID.
NOTE: IUT needs to establish or have already established an SS7 link.	

TPId:	**M2UA_SGP_MAUP_V_02**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.1 of RFC 3331 [2]
Purpose:	Ensure that IUT is able to send a Data message.
NOTE: IUT needs to receive an MTP2 MSU on the SS7 link to trigger this behaviour.	

TPId:	**M2UA_SGP_MAUP_V_03**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.4 of RFC 3331 [2]
Purpose:	Ensure that IUT sends a ReleaseConfirm message, when it receives a Release Request message with configured IID.
NOTE: IUT needs to release the SS7 link.	

TPId:	M2UA_SGP_MAUP_V_04
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.4 of RFC 3331 [2]
Purpose:	Ensure that IUT is able to send a Release Indication message.
NOTE: IUT needs to receive an SIOS message on the SS7 link to trigger this behaviour.	

TPId:	M2UA_SGP_MAUP_V_05
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_FLUSH_BUFFERS", when it receives a State Request from the ASP, with the state as "STATUS_FLUSH_BUFFERS".

TPId:	M2UA_SGP_MAUP_V_06
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_CONTINUE", when it receives a State Request from the ASP, with the state as "STATUS_CONTINUE".

TPId:	M2UA_SGP_MAUP_V_07
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_CLEAR_RTB", when it receives a State Request from the ASP, with the state as "STATUS_CLEAR_RTB". Alternatively the IUT might respond with an Error message, if due to internal conditions the command can not be executed.

TPId:	M2UA_SGP_MAUP_V_08
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_AUDIT", when it receives a State Request from the ASP, with the state as "STATUS_AUDIT".

TPId:	M2UA_SGP_MAUP_V_09
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_CONG_CLEAR", when it receives a State Request from the ASP, with the state as "STATUS_CONG_CLEAR".

TPId:	M2UA_SGP_MAUP_V_10
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_CONG_ACCEPT", when it receives a State Request from the ASP, with the state as "STATUS_CONG_ACCEPT".

TPId:	M2UA_SGP_MAUP_V_11
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a State Confirm message with state as "STATUS_CONG_DISCARD", when it receives a State Request from the ASP, with the state as "STATUS_CONG_DISCARD".

TPId:	M2UA_SGP_MAUP_V_12
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.7 of RFC 3331 [2]
Purpose:	Ensure that the IUT is able to send a State Indication message with event as "EVENT_RPO_ENTER".
NOTE: IUT needs to experience a remote entered processor outage condition to trigger this behaviour.	

TPId:	M2UA_SGP_MAUP_V_13
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.7 of RFC 3331 [2]
Purpose:	Ensure that the IUT is able to send a State Indication message with event as "EVENT_LPO_ENTER".
NOTE: IUT needs to experience a link entered processor outage condition to trigger this behaviour.	

TPId:	M2UA_SGP_MAUP_V_14
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP AssociationSCTP association is established between ASP and SGPIUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.8 of RFC 3331 [2] and clause 6 of TS 102 141 [1]
Purpose:	Ensure that the IUT is able to send a Congestion Indication message with congestion status as LEVEL_3".
NOTE: IUT needs to experience the start of a congestion condition to trigger this behaviour.	

TPId:	M2UA_SGP_MAUP_V_15
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Section 3.3.1.8 of RFC 3331 [2] and clause 6 of TS 102 141 [1]
Purpose:	Ensure that the IUT is able to send a Congestion Indication message with congestion status as "LEVEL_NONE".
NOTE: IUT needs to experience the end of a congestion condition to trigger this behaviour.	

TPId:	M2UA_SGP_MAUP_V_16
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.3.1.9 and 3.3.1.10 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a Retrieval Confirm message with action as "ACTION_RTRV_BSN", when it receives a Retrieval Request from the ASP, with the action as "ACTION_RTRV_BSN".

TPId:	M2UA_SGP_MAUP_V_17
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service. Retrieval Request and Retrieval Confirm messages with action as "ACTION_RTRV_BSN" have already been exchanged.
Ref:	Sections 3.3.1.9 and 3.3.1.10 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends a Retrieval Confirm message with action as "ACTION_RTRV_MSGS", when it receives a Retrieval Request from the ASP, with the action as "ACTION_RTRV_MSGS".

TPId:	M2UA_SGP_MAUP_V_18
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service. Retrieval Request and Retrieval Confirm messages with action as "ACTION_RTRV_BSN" and afterwards with action as "ACTION_RTRV_MSGS" have already been exchanged.
Ref:	Section 3.3.1.11 of RFC 3331 [2]
Purpose:	Ensure that the IUT is able to send a Retrieval Indication message.

TPId:	M2UA_SGP_MAUP_V_19
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 3.1.6 and 3.3.1.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT is able to send a Data message with proper padding.
NOTE: IUT needs to receive an MTP2 PDU with of a length requiring padding (i.e. not a multiple of 4) on the SS7 link to trigger this behaviour.	

5.2.3.2 Inopportune Behaviour Test cases

No test requirements identified.

5.2.3.3 Invalid Behaviour Test cases

TPId:	**M2UA_SGP_MAUP_IV_01**
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state and SS7 link is established and in service.
Ref:	Sections 1.5.4.1 and 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT provides an Error message with error code as "Invalid Stream Identifier" , when it receives a Data message on stream 0.

TPId:	**M2UA_SGP_MAUP_IV_02**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and IUT. ASP is in active state.
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Invalid Interface Identifier", when it receives an State Request from the ASP for not configured IID.

5.3 Test Purposes for Application Server Process (ASP)

5.3.1 ASP STATE and Traffic maintenance

5.3.1.1 Valid Behaviour Test Cases

TPId:	**M2UA_ASP_ASPM_V_01**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in down state.
Ref:	Sections 3.3.2.1, 3.3.2.2, 4.3.2 and 4.3.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to enter the ASP-INACTIVE state, sends an ASP Up message and moves to inactive state on receiving an ASP Up Ack message.
NOTE 1: The iut may send an asp active message immediately afterwards. NOTE 2: The iut management interface is used to trigger the sending of the asp up message.	

TPId:	**M2UA_ASP_ASPM_V_02**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP IUT is in inactive state.
Ref:	Sections 3.3.2.7, 3.3.2.8, 4.3.2 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to enter the ASP-ACTIVE state, sends an ASP Active message and moves to active state on receiving an ASPActive Ack message.
NOTE: The IUT management interface is used to trigger the sending of the ASP Active message.	

TPId:	M2UA_ASP_ASPM_V_03
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Sections 3.3.2.9, 3.3.2.10 and 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to enter the ASP-INACTIVE state, sends an ASP Inactive message and moves to inactive state on receiving an ASP Inactive Ack message.
NOTE: The IUT management interface is used to trigger the sending of the ASP Active message.	

TPId:	M2UA_ASP_ASPM_V_04
Status:	Optional
Test Configuration	ASP is configured in two different AS.If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in inactive state.
Ref:	Sections 3.3.2.7, 3.3.2.8, 4.3.2 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that IUT, to enter the ASP-ACTIVE state for both AS, sends either one ASP Active message with configured IIDs for both AS or one ASP Active message for each AS. Validate that the state of the ASP moves to active in both AS, when ASP Active Ack message is received with all parameters.
NOTE: The IUT management interface is used to trigger the sending of the ASP Active message.	

TPId:	M2UA_ASP_ASPM_V_05
Status:	Optional
Test Configuration	ASP is configured in two different AS.If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in inactive state.
Ref:	Sections 3.3.2.7, 3.3.2.8, 4.3.2 and 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to enter the ASP-ACTIVE state for AS1, sends an ASP Active message with configured IID as that of AS1. Ensure that the state of the ASP moves to active for AS1 only, when it receives an ASP Active Ack message with IID as that of AS1.
NOTE: The IUT management interface is used to trigger the sending of the ASP Active message.	

TPId:	M2UA_ASP_ASPM_V_06
Status:	Optional
Test Configuration	ASP is configured in two different AS.If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Sections 3.3.2.9, 3.3.2.10 and 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that IUT, to enter the ASP-INACTIVE state for both AS, sends an ASP Inactive message with configured IIDs for both AS. Validate that the state of the ASP moves to inactive in both AS, when ASP Inactive Ack message is received with all parameters.
NOTE: The IUT management interface is used to trigger the sending of the ASP Active message.	

TPId:	M2UA_ASP_ASPM_V_07
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Section 4.3.3 of RFC 3331 [2]
Purpose:	Ensure that the IUT on receiving the SCTP-RESTART_INDICATION (caused by the SGP performing a restart operation) from SCTP, moves the state of the ASP to down.

TPId:	M2UA_ASP_ASPM_V_08
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Sections 3.3.2.5, 3.3.2.6 and 4.3.4.6 of RFC 3331 [2]
Purpose:	Validate that the IUT responds with a Heartbeat Ack message, when it receives a Heartbeat message. Ensure that Heartbeat Ack is sent by the IUT with same heartbeat data provided in the Heartbeat message.

TPId:	M2UA_ASP_ASPM_V_09
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in down state.
Ref:	Section 4.3.4.1 of RFC 3331 [2]
Purpose:	Ensure that the ASP Up message is retransmitted by the IUT on expiry of timer T(ack), when it receives no ASP Up Ack.

TPId:	M2UA_ASP_ASPM_V_10
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in inactive state.
Ref:	Section 4.3.4.2 of RFC 3331 [2]
Purpose:	Ensure that the ASP Down message is retransmitted by the IUT on expiry of timer T(ack), when it receives no ASP Down Ack.

TPId:	M2UA_ASP_ASPM_V_11
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in inactive state.
Ref:	Section 4.3.4.3 of RFC 3331 [2]
Purpose:	Ensure that the ASP Active message is retransmitted by the IUT on expiry of timer T(ack), when it receives no ASPActive Ack.

TPId:	M2UA_ASP_ASPM_V_12
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Section 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that the ASP Inactive message is retransmitted by the IUT on expiry of timer T(ack), when it receives no ASP Inactive Ack.

5.3.1.2 Inopportune Behaviour Test Cases

TPId:	**M2UA_ASP_ASPM_IO_01**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. ASP is in inactive state.
Ref:	Section 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that the IUT accepts the ASP Inactive Ack message in response to an ASP Active message transmitted by the IUT to enter the ASP-ACTIVE state and remains the ASP state in Inactive.

TPId:	**M2UA_ASP_ASPM_IO_02**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Section 4.3.4.4 of RFC 3331 [2]
Purpose:	Ensure that the IUT accepts the ASP Inactive Ack message and enters the ASP state to Inactive.

TPId:	**M2UA_ASP_ASPM_IO_03**
Status:	Optional
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in inactive state.
Ref:	Section 4.3.4.2 of RFC 3331 [2]
Purpose:	Validate that the IUT moves the ASP state to down, when it receives an ASP Down Ack message without having sent an ASP Down message.
NOTE: The IUT may, to re-enter the inactive state, send an ASP Up message afterwards.	

TPId:	**M2UA_ASP_ASPM_IO_04**
Status:	Optional
Test Configuration	One ASP is configured in an AS. If necessary the ASP has to be pre-configured at the IUT.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state.
Ref:	Section 4.3.4.2 of RFC 3331 [2]
Purpose:	Validate that the IUT moves the ASP state to down, when it receives an ASP Down Ack message without having sent an ASP Down message.
NOTE: The IUT may, to re-enter the active state, send an ASP Up message and after the receipt of the ASP Up Ack message send an ASP Active message afterwards.	

5.3.1.3 Invalid Behaviour Test cases

No test requirements identified.

5.3.2 Interface Identifier MGMT (IIM) Messages

NOTE: The tests for IIM messages are not relevant for an IUT implemented according to TS 102 141 [1], as this document does not permit the use of IIM messages. A pure RFC 3331 [2] implementation should be tested according to the test purposes in this section.

5.3.2.1 Valid Behaviour Test cases

TPId:	**M2UA_ASP_IIM_V_01**
Status:	Mandatory
Test Configuration	One ASP is configured in the stack but not yet associated with the AS.
Pre-Condition	SCTP association is established between SGP and IUT. IUT is in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to register itself with the SGP for an AS, sends a Registration Request message with link key as defined in AS configuration and accepts the receipt of the Registration Response message with registration result as "Successfully Registered".
NOTE: The IUT management interface is used to trigger the sending of the Registration Request message.	

TPId:	**M2UA_ASP_IIM_V_02**
Status:	Optional
Test Configuration	One ASP is configured in the stack but not yet associated with the AS. Two AS are configured in loadsharing mode.
Pre-Condition	SCTP association is established between SGP and IUT. IUT is in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to register itself with the SGP for two AS sends one or two Registration Request messages with two different link keys as defined in AS configurations and accepts one Registration Response message for both registrations with registration result as "Successfully Registered".
NOTE: The IUT management interface is used to trigger the sending of the Registration Request message(s).	

TPId:	**M2UA_ASP_IIM_V_03**
Status:	Optional
Test Configuration	One ASP is configured in the stack but not yet associated with the AS. Two AS are configured in loadsharing mode.
Pre-Condition	SCTP association is established between SGP and IUT. IUT is in inactive state.
Ref:	Sections 3.3.4.1, 3.3.4.2 and 4.4.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to register itself with the SGP for two AS sends one or two Registration Request messages with two different link keys as defined in AS configurations and accepts one Registration Response message per registration each with registration result as "Successfully Registered".
NOTE: The Registration Request message(s) may be triggered by the LM by sending M-LINK_KEY_REG request primitives.	

TPId:	**M2UA_ASP_IIM_V_04**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between SGP and IUT. ASP is in Inactive state.
Ref:	Sections 3.3.4.3, 3.3.4.4 and 4.4.2 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to de-register itself with the SGP for an AS, sends a Deregistration Request message with configured IIDs and accepts the Deregistration Response message with deregistration result as "Successfully De-registered".
NOTE: The IUT management interface is used to trigger the sending of the Deregistration Request message.	

TPId:	M2UA_ASP_IIM_V_05
Status:	Optional
Test Configuration	The Interface Identifiers are pre-configured at the SGP and assigned to two different ASs
Pre-Condition	SCTP association is established between SGPand IUT. IUT has successfully registered for Interface Identifiers related to different ASs at the SGP. ASP is in inactive state in both AS.
Ref:	Sections 3.3.4.3, 3.3.4.4 and 4.4.2 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to de-register itself with the SGP for both AS, sends one or two Deregistration Request message with configured IIDs and accepts one Deregistration Response messages per deregistration each with deregistration result as "Successfully De-registered".
NOTE: The IUT management interface is used to trigger the sending of the Deregistration Request message(s).	

5.3.2.2 Inopportune Behaviour Test cases

No test requirements identified.

5.3.2.3 Invalid Behaviour Test cases

No test requirements identified.

5.3.3 MTP2 User Adaptation Messages

5.3.3.1 Valid Behaviour Test cases

TPId:	M2UA_ASP_MAUP_V_01
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Section 3.3.1.3 of RFC 3331 [2]
Purpose:	Ensure that IUT, to establish an SS7 link, sends an Establish Request message and accepts an Establish Confirm message in response.

TPId:	M2UA_ASP_MAUP_V_02
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.1 and 3.3.1.2 of RFC 3331 [2]
Purpose:	Ensure that IUT is able to send a Data message.

TPId:	M2UA_ASP_MAUP_V_03
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.1 and 3.3.1.2 of RFC 3331 [2]
Purpose:	To verify that a Data Acknowledge message is send in response to a Data message including the Correlation Id parameter. Validate that the Data Acknowledge message has the same correlation ID.

TPId:	**M2UA_ASP_MAUP_V_04**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Section 3.3.1.4 of RFC 3331 [2]
Purpose:	Ensure that IUT, to release an SS7 link, sends a Release Request message and accepts a Release Confirm message in response.

TPId:	**M2UA_ASP_MAUP_V_05**
Status:	Mandatory
Test Configuration	Single ASP is configured in any AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Section 3.3.1.7 of RFC 3331 [2]
Purpose:	Ensure that the IUT accepts State Indication messages and does not respond.

TPId:	**M2UA_ASP_MAUP_V_06**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Section 3.3.1.8 of RFC 3331 [2]
Purpose:	Ensure that the IUT accepts Congestion indication messages with event as "LEVEL_3" and does not respond.

TPId:	**M2UA_ASP_MAUP_V_07**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.9 and 3.3.1.10 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to retrieve the BSN, sends a Retrieval Request message, with action as "ACTION_RTRV_BSN" and accepts a Retrieval Confirm message with result as "RESULT_SUCCESS" in response.

TPId:	**M2UA_ASP_MAUP_V_08**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP. Retrieval Request and Retrieval Confirm messages with action as "ACTION_RTRV_BSN" have already been exchanged.
Ref:	Sections 3.3.1.9 and 3.3.1.10 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to retrieve PDUs from the queues, sends a Retrieval Request message, with action as "ACTION_RTRV_MSGS" and accepts a Retrieval Confirm message with result as "RESULT_SUCCESS" in response.

TPId:	M2UA_ASP_MAUP_V_09
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP. Retrieval Request and Retrieval Confirm messages with action as "ACTION_RTRV_BSN" have already been exchanged.
Ref:	Sections 3.3.1.9 and 3.3.1.10 of RFC 3331 [2]
Purpose:	Ensure that the IUT having sent a Retrieval Request message, accepts a Retrieval Confirm message with result as "RESULT_FAILURE".

TPId:	M2UA_ASP_MAUP_V_10
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to request emergency alignment of the SS7 link, sends a State Request message, with action as "STATUS_EMER_SET" and accepts a State Confirm message in response.

TPId:	M2UA_ASP_MAUP_V_11
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP. IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to cancel emergency alignement of the SS7 link, sends a State Request message, with action as "STATUS_EMER_CLEAR" and accepts a State Confirm message in response.

TPId:	M2UA_ASP_MAUP_V_12
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to clear all queues, sends a State Request message, with action as "STATUS_FLUSH_BUFFER" and accepts a State Confirm message in response.

TPId:	M2UA_ASP_MAUP_V_13
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to clear the retransmit queue, sends a State Request message, with action as "STATUS_CLEAR_RTB" and accepts a State Confirm message in response.

TPId:	**M2UA_ASP_MAUP_V_14**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Sections 3.3.1.5 and 3.3.1.6 of RFC 3331 [2]
Purpose:	Ensure that the IUT, to audit the state of the link, sends a State Request message, with action as "STATUS_AUDIT" and accepts a State Confirm message in response.

TPId:	**M2UA_ASP_MAUP_V_15**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP IUT is in active state and has successfully requested the establishment of an SS7 link at the SGP.
Ref:	Section 3.3.1.4 of RFC 3331 [2]
Purpose:	Ensure that the IUT accepts a Release Indication message for a link.

TPId:	**M2UA_ASP_MAUP_V_16**
Status:	Mandatory
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between IUT and SGP IUT is in active state and requested the establishment of an SS7 link at the SGP.
Ref:	Section 3.3.1.3 of RFC 3331 [2]
Purpose:	Ensure that IUT, having sent an Establish Request message, on the expiry of the timer, re-sends the Establish Request message.

5.3.3.2 Inopportune Behaviour Test cases

No test requirements identified.

5.3.3.3 Invalid Behaviour Test cases

No test requirements identified.

5.4 Test Purposes for General Error Handling (GEH)

The following tests may be repeated for different messages in different states and are valid for both testing the SGP and the ASP.

TPId:	**M2UA_GEH_01**
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Invalid Interface Identifier", when it receives a message from peer with a non-configured interface identifier.

TPId:	M2UA_GEH_02
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP ASP is in Down state.
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Unsupported Traffic Handling mode", when it receives a message with an unsupported traffic handling mode.

TPId:	M2UA_GEH_03
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP ASP is in Down state.
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Unsupported Interface Identifier Type", when it receives a message from peer with a non-supported (e.g. text-based) interface identifier type.

TPId:	M2UA_GEH_04
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Unsupported Message Class", when it receives a message from peer with an unexpected or unsupported message class.

TPId:	M2UA_GEH_05
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Invalid Parameter Value", when it receives a message from peer with an invalid parameter value

TPId:	M2UA_GEH_06
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Parameter Field Value", when it receives a message from peer with a parameter with a wrong length field.

TPId:	M2UA_GEH_07
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Unexpected Parameter", when it receives a message from peer with an invalid parameter.

TPId:	**M2UA_GEH_08**
Status:	Optional
Test Configuration	One ASP is configured in an AS.
Pre-Condition	SCTP association is established between ASP and SGP
Ref:	Section 3.3.3.1 of RFC 3331 [2]
Purpose:	Ensure that the IUT sends an Error message with error code as "Missing Parameter", when it receives a message from peer with a mandatory parameter missing.

History

Document history		
V1.1.1	December 2004	Publication