



TECHNICAL SPECIFICATION

**Intelligent Transport Systems (ITS);  
Testing;  
Conformance test specifications for  
Facilities layer protocols and communication requirements  
for infrastructure services;  
Part 2: Test Suite Structure and Test Purposes (TSS & TP)**

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## Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

The present document is part 2 of a multi-part deliverable covering Conformance test specifications for Facilities layer protocols and communication requirements for infrastructure services, as identified below:

Part 1: "Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma";

**Part 2: "Test Suite Structure and Test Purposes (TSS & TP)";**

Part 3: "Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)".

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## 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 and Test Purposes (TSS & TP) for MAPEM-SPATEM, IVIM and SREM-SSEM as defined in SAE J2735 [1] and ETSI TS 103 301 [2] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [i.4]. The ISO standards for the methodology of conformance testing (ISO/IEC 9646-1 [i.2] and ISO/IEC 9646-2 [i.3]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [i.5]) are used as a basis for the test methodology.

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## 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 <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.

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

- [1] SAE J2735 (2016-03): "Dedicated Short Range Communications (DSRC) Message Set Dictionary™".
- [2] ETSI TS 103 301 (V1.1.1) (2016-11): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Facilities layer protocols and communication requirements for infrastructure services".
- [3] ETSI TS 103 191-1 (V1.2.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Facilities layer protocols and communication requirements for infrastructure services; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma".

### 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI EG 202 798 (V1.1.1): "Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing".
- [i.2] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".
- [i.3] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

- [i.4] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".
- [i.5] ETSI ETS 300 406 (1995): "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 SAE J2735 [1], ISO/IEC 9646-1 [i.2] and in ISO/IEC 9646-7 [i.4] apply.

### 3.2 Abbreviations

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

ATS	Abstract Test Suite
BTP	Basic Transport Protocol
BV	Valid test events for Behaviour tests
GN	GeoNetworking
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
IUT	Implementation Under Test
IVI	Infrastructure to Vehicle Information
IVIM	IVI-message
MAPEM	MapData Messages
MSD	Message Dissemination
MSP	Message Processing
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RLT	Road and Lane Topology
SAE	Society of Automotive Engineers
SHB	Single Hop Broadcast
SPATEM	Signal Phase And Timing Messages
SREM	Signal Request Message
SSEM	Signal Response Message
TLC	Traffic Light Control
TLM	Traffic Light Manoeuvre
TP	Test Purposes
TSS	Test Suite Structure

## 4 Test Suite Structure (TSS)

### 4.1 Structure for MAPEM-SPATEM tests

Table 1 shows the MAPEM-SPATEM Test Suite Structure (TSS) including its subgroups defined for conformance testing.

**Table 1: TSS for MAPEM-SPATEM**

Root	Group	Category
MAPEM-SPATEM	Message Dissemination	Valid
	Message processing	Valid

The test suite is structured as a tree with the root defined as MAPEM-SPATEM. The tree is of rank 2 with the first rank a Group and the second a category. The second rank is the standard ISO conformance test categories.

#### 4.1.1 Test groups

##### 4.1.1.1 Introduction

The test suite has a total of three levels. The first level is the root. The second level separates the root into various functional areas. The third level is the standard ISO conformance test categories.

##### 4.1.1.2 Root

The root identifies the MapData and SPAT Messages given in SAE J2735 [1] and ETSI TS 103 301 [2].

##### 4.1.1.3 Groups

This level contains two functional areas identified as:

- Message Dissemination
- Message Processing

##### 4.1.1.4 Categories

This level contains the standard ISO conformance test categories limited to valid behaviour.

## 4.2 Structure for IVIM tests

Table 2 shows the IVIM Test Suite Structure (TSS) including its subgroups defined for conformance testing.

**Table 2: TSS for IVIM**

Root	Group	Category
IVIM	Message Dissemination	Valid
	Message processing	Valid

The test suite is structured as a tree with the root defined as IVI. The tree is of rank 2 with the first rank a Group and the second a category. The second rank is the standard ISO conformance test categories.

## 4.2.1 Test groups

### 4.2.1.1 Introduction

The test suite has a total of three levels. The first level is the root. The second level separates the root into various functional areas. The third level is the standard ISO conformance test categories.

### 4.2.1.2 Root

The root identifies the IVI Messages given in ETSI TS 103 301 [2].

### 4.2.1.3 Groups

This level contains two functional areas identified as:

- Message Dissemination
- Message Processing

### 4.2.1.4 Categories

This level contains the standard ISO conformance test categories limited to valid behaviour.

## 4.3 Structure for SREM-SSEM tests

Table 3 shows the SREM-SSEM Test Suite Structure (TSS) including its subgroups defined for conformance testing.

**Table 3: TSS for SREM-SSEM**

Root	Group	Category
SREM-SSEM	Message Dissemination	Valid
	Message processing	Valid

The test suite is structured as a tree with the root defined as SREM-SSEM. The tree is of rank 2 with the first rank a Group and the second a category. The second rank is the standard ISO conformance test categories.

## 4.3.1 Test groups

### 4.3.1.1 Introduction

The test suite has a total of three levels. The first level is the root. The second level separates the root into various functional areas. The third level is the standard ISO conformance test categories.

### 4.3.1.2 Root

The root identifies the SREM and SSEM given in ETSI TS 103 301 [2].

### 4.3.1.3 Groups

This level contains two functional areas identified as:

- Message Dissemination
- Message Processing

### 4.3.1.4 Categories

This level contains the standard ISO conformance test categories limited to valid behaviour.

## 5 Test Purposes (TPs)

### 5.1 Introduction

#### 5.1.1 TP definition conventions

The TP definition is built according to ETSI EG 202 798 [i.1].

#### 5.1.2 TP Identifier naming conventions

The identifier of the TP is built according to table 4.

**Table 4: TP naming convention**

Identifier	TP<root>/<gr>/<x>/<nn>	Example	
	<root> = root	IS_TLM	
		IS_RLT	
		IS_IVI	
		IS_TLC	
	<gr> = group	MSGF	Message Dissemination
		EVUP	Event Update
		EVGN	Event Generation
		EVTR	Event Termination
		COMM	Communication
		GFQ	Timers
		SEC_SND	Send behaviour of Security
		SSP_SND	Send behaviour of Specific service Permission
		SSP_RCV	Receive behaviour of Specific service Permission
	<x> = type of testing	BV	Valid event tests
	<nn> = sequential number		01 to 99

#### 5.1.3 Rules for the behaviour description

The description of the TP is built according to ETSI EG 202 798 [i.1].

SAE J2735 [1] does not use finite state machine concept. As consequence, the test purposes use a generic "Initial State" that corresponds to a state where the IUT is ready for starting the test execution. Furthermore, the IUT shall be left in this "Initial State", when the test is completed.

Being in the "Initial State" refers to the starting point of the initial device configuration. There are no pending actions, no instantiated buffers or variables, which could disturb the execution of a test.

## 5.1.4 Sources of TP definitions

All TPs have been specified according to SAE J2735 [1] and ETSI TS 103 301 [2].

## 5.1.5 Mnemonics for PICS reference

To avoid an update of all TPs when the PICS document is changed, table 5 introduces mnemonics name and the correspondence with the real PICS item number.

The PICS item column refers to tables and items of ETSI TS 103 191-1 [3]. The 'PICS item' as defined in ETSI TS 103 191-1 [3] shall be used to determine the test applicability.

**Table 5: Mnemonics for PICS reference**

Mnemonic	PICS item
PICS_SPATEM_GENERATION	A.2/3
PICS_SPATEM_RECEPTION	A.2/4
PICS_MAPEM_GENERATION	A.2/1
PICS_MAPEM_RECEPTION	A.2/2
PICS_IVIM_GENERATION	A.3/1
PICS_IVIM_RECEPTION	A.3/5
PICS_IVIM_UPDATE	A.3/2
PICS_IVIM_CANCELLATION	A.3/3
PICS_IVIM_NEGATION	A.3/4
PICS_SREM_GENERATION	A.5/1
PICS_SREM_RECEPTION	A.5/2
PICS_SSEM_GENERATION	A.5/3
PICS_SSEM_RECEPTION	A.5/4
PICS_IS_IUT_SECURED	A.1/1
PICS_T_GENIVIMMIN	A.4/1
PICS_T_GENIVIMMAX	A.4/2

## 5.2 Requirements

### 5.2.1 Traffic Light Manoeuvre (TLM) service

#### 5.2.1.1 Check the message protocol version

<b>TP Id</b>	TP_IS_TLM_MSGF_BV_01
<b>Summary</b>	Check that protocolVersion is set to 1 and messageID is set to 4
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.3
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending SPATEM  ensure that  when  a SPATEM is generated  then  the IUT sends a valid SPATEM  containing ITS PDU header  containing protocolVersion  indicating value '1'  and containing messageID  indicating value '4'</p>	

<b>TP Id</b>	TP_IS_TLM_MSGF_BV_02
<b>Summary</b>	Check that the IUT can successfully process all mandatory fields of SPATEM received
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.3
<b>PICS Selection</b>	PICS_SPATEM_RECEPTION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having receive a valid SPATEM</p> <p>ensure that  when  the IUT receives a valid SPATEM  then  the IUT forwards the SPATEM content to upper layers  and the IUT forwards the SPATEM content to other facilities</p>	

### 5.2.1.2 TLM service trigger, update, repetition and termination

<b>TP Id</b>	TP_IS_TLM_EVGN_BV_01
<b>Summary</b>	Check that TLM Service generates a new SPATEM on reception of a valid AppSPATEM_Start request
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT has not sent any SPATEM yet</p> <p>ensure that  when  the IUT receives an AppSPATEM_Start request from the application layer  then  the IUT sends a valid SPATEM</p>	

<b>TP Id</b>	TP_IS_TLM_EVGN_BV_02
<b>Summary</b>	Check that TLM Service generates SPATEM are time ordered
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT has sent a SPATEM</p> <p>ensure that  when  several SPATEM are generated  then  the IUT sends SPATEM in time order</p>	

<b>TP Id</b>	TP_IS_TLM_EVGN_BV_03
<b>Summary</b>	Check that TLM Service terminates on reception of a valid AppSPATEM_Stop request
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending SPATEM</p> <p>ensure that  when  the IUT receives an AppSPATEM_Stop request from the application layer  then  the IUT stops sending SPATEM</p>	

<b>TP Id</b>	TP_IS_TLM_EVGN_BV_04
<b>Summary</b>	Check that TLM Service generates a new SPATEM on reception of a valid AppSPATEM_Trigger request
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"</p> <p>ensure that  when  the IUT receives an AppSPATEM_Trigger request from the application layer  then  the IUT sends a valid SPATEM</p>	

### 5.2.1.3 Check presence of destination area

<b>TP Id</b>	TP_IS_TLM_COM_BV_01
<b>Summary</b>	Check that TLM Service provides the destination area in SPATEM
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending SPATEM</p> <p>ensure that  when  a SPATEM is generated  then  the IUT sends a valid SPATEM  containing spat  containing regional  containing at least on region  indicating a regionId  and indication a regExtValue</p>	

### 5.2.1.4 Check BTP type and port number

<b>TP Id</b>	TP_IS_TLM_COM_BV_02
<b>Summary</b>	Check that SPATEM uses BTP_B packet Check that the destination port for SPATEM is set to 2004
<b>Reference</b>	ETSI TS 103 301 [2], clauses 10.2 and 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending SPATEM</p> <p>ensure that  when  a SPATEM is generated  then  the IUT sends a valid SPATEM  encapsulated in a BTP-B packet  containing a destination port value set to 2004  and containing a destination port info value set to 0</p>	

## 5.2.1.5 Check destination type

<b>TP Id</b>	TP_IS_TLM_COM_BV_03
<b>Summary</b>	Check that TLM service encapsulates SPATEM in a GBC with the HeaderType field set to the value of 4
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending SPATEM  ensure that  when  a SPATEM is generated  then  the IUT sends a valid SPATEM  encapsulated in a GBC packet  containing a correctly formatted Common Header  containing HeaderType field  indicating the value '4'</p>	

## 5.2.1.6 TLM security parameters

## 5.2.1.6.1 Check TLM ITS AID value

<b>TP Id</b>	TP_IS_TLM_SEC_SND_BV_01
<b>Summary</b>	Check that TLM service uses certificate containing valid ITS AID to sign SPATEM messages
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT is operating in secured mode  and the IUT sending SPATEM  ensure that  when  a SPATEM is generated  then  the IUT sends a valid SPATEM  containing a correctly formatted Security Header  containing SignerInfo header  containing certificate  containing SecurityAttribute of type its_aid_ssp_list  containing ItsAidSsp item  containing its_aid  indicating 137</p>	

## 5.2.1.6.2 Check TLM SSP version

<b>TP Id</b>	TP_IS_TLM_SSP_SND_BV_01
<b>Summary</b>	Check that TLM service uses certificate containing valid Service Specific Permissions to sign SPATEM messages and the SSP version is set to 1
<b>Reference</b>	ETSI TS 103 301 [2], clause 4.5.1
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT sending SPATEM</li> </ul> <p>ensure that</p> <p>when</p> <ul style="list-style-type: none"> <li>a SPATEM is generated</li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT sends a valid SPATEM <ul style="list-style-type: none"> <li>containing a correctly formatted Security Header <ul style="list-style-type: none"> <li>containing SignerInfo header <ul style="list-style-type: none"> <li>containing certificate <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>indicating first octet = 01h</li> </ul> </li> </ul>	

## 5.2.1.6.3 Check TLM Service specific parameters

## 5.2.1.6.3.1 SSP IntersectionState

<b>TP Id</b>	TP_IS_TLM_SSP_SND_BV_02
<b>Summary</b>	Check that TLM service sends a SPAT message containing IntersectionState without advisory speed and manoeuvre assist information when it is permitted by the signing certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT sending SPATEM</li> <li>and the IUT uses the certificate to sign SPATEM messages <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> </ul> </li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 80h</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT is triggered to send a SPATEM <ul style="list-style-type: none"> <li>not containing advisory speed</li> <li>and not containing manoeuvre assisting information</li> <li>and not containing public transport prioritization</li> </ul> </li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT sends a valid SPATEM <ul style="list-style-type: none"> <li>containing spat.intersections <ul style="list-style-type: none"> <li>containing any items of type IntersectionState <ul style="list-style-type: none"> <li>not containing manoeuvreAssistList</li> <li>and not containing regional</li> <li>and containing states <ul style="list-style-type: none"> <li>containing any item of type MovementEvent <ul style="list-style-type: none"> <li>not containing speeds</li> <li>and not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul>	

<b>TP Id</b>	TP_IS_TLM_SSP_SND_BV_03
<b>Summary</b>	Check that TLM service does not send a SPATEM message containing IntersectionState if it is not permitted by the certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT sending SPATEM</li> <li>and the IUT uses the certificate to sign SPATEM messages <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> </ul> </li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 78h</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT is triggered to send a SPATEM <ul style="list-style-type: none"> <li>not containing advisory speed</li> <li>and not containing manoeuvre assisting information</li> <li>and not containing public transport prioritization</li> </ul> </li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT does not send a SPATEM</li> </ul> </li> </ul>	
<b>TP Id</b>	TP_IS_TLM_SSP_RCV_04
<b>Summary</b>	Check that the IUT discards the SPATEM message containing IntersectionState without additional information not permitted by the signing certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT is able to process received SPATEM</li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives SPATEM <ul style="list-style-type: none"> <li>containing spat.intersections <ul style="list-style-type: none"> <li>containing any items of type IntersectionState <ul style="list-style-type: none"> <li>not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> <li>and containing states <ul style="list-style-type: none"> <li>containing any item of type MovementEvent <ul style="list-style-type: none"> <li>not containing speeds</li> <li>and not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>embedded in GeoNetworking packet <ul style="list-style-type: none"> <li>containing SecurityHeader <ul style="list-style-type: none"> <li>containing SignerInfo header <ul style="list-style-type: none"> <li>containing certificate <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> </ul> </li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 78h</li> </ul> </li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT discards the SPATEM</li> </ul> </li></ul></li></ul>	

<b>TP Id</b>	TP_IS_TLM_SSP_RCV_05
<b>Summary</b>	Check that the IUT accepts the SPATEM message containing IntersectionState without additional information permitted by the signing certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT is able to process received SPATEM</li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives SPATEM <ul style="list-style-type: none"> <li>containing spat.intersections <ul style="list-style-type: none"> <li>containing any items of type IntersectionState <ul style="list-style-type: none"> <li>not containing manoeuvreAssistList</li> <li>and not containing regional</li> <li>and containing states <ul style="list-style-type: none"> <li>containing any item of type MovementEvent <ul style="list-style-type: none"> <li>not containing speeds</li> <li>and not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>embedded in GeoNetworking packet <ul style="list-style-type: none"> <li>containing SecurityHeader <ul style="list-style-type: none"> <li>containing SignerInfo header <ul style="list-style-type: none"> <li>containing certificate <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 80h</li> </ul> </li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT accepts the SPATEM</li> </ul>	

## 5.2.1.6.3.2 SSP IntersectionState.status

<b>TP Id</b>	TP_IS_TLM_SSP_SND_BV_06
<b>Summary</b>	Check that TLM service sends a SPAT message containing IntersectionState without advisory speed and manoeuvre assist information when it is permitted by the signing certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT sending SPATEM</li> <li>and the IUT uses the certificate to sign SPATEM messages <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> </ul> </li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 80h</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT is triggered to send a SPATEM <ul style="list-style-type: none"> <li>not containing advisory speed</li> <li>and not containing manoeuvre assisting information</li> <li>and not containing public transport prioritization</li> </ul> </li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT sends a valid SPATEM <ul style="list-style-type: none"> <li>containing spat.intersections <ul style="list-style-type: none"> <li>containing any items of type IntersectionState <ul style="list-style-type: none"> <li>not containing manoeuvreAssistList</li> <li>and not containing regional</li> <li>and containing states <ul style="list-style-type: none"> <li>containing any item of type MovementEvent <ul style="list-style-type: none"> <li>not containing speeds</li> <li>and not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul>	

<b>TP Id</b>	TP_IS_TLM_SSP_SND_BV_07
<b>Summary</b>	Check that TLM service does not send a SPATEM message containing IntersectionState if it is not permitted by the certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT sending SPATEM</li> <li>and the IUT uses the certificate to sign SPATEM messages <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> </ul> </li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 78h</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT is triggered to send a SPATEM <ul style="list-style-type: none"> <li>not containing advisory speed</li> <li>and not containing manoeuvre assisting information</li> <li>and not containing public transport prioritization</li> </ul> </li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT does not send a SPATEM</li> </ul> </li> </ul>	
<b>TP Id</b>	TP_IS_TLM_SSP_RCV_BO_08
<b>Summary</b>	Check that the IUT discards the SPATEM message containing IntersectionState without additional information not permitted by the signing certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT is operating in secured mode</li> <li>and the IUT is able to process received SPATEM</li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives SPATEM <ul style="list-style-type: none"> <li>containing spat.intersections <ul style="list-style-type: none"> <li>containing any items of type IntersectionState <ul style="list-style-type: none"> <li>not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> <li>and containing states <ul style="list-style-type: none"> <li>containing any item of type MovementEvent <ul style="list-style-type: none"> <li>not containing speeds</li> <li>and not containing manoeuvreAssistList</li> <li>and not containing regional</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>embedded in GeoNetworking packet <ul style="list-style-type: none"> <li>containing SecurityHeader <ul style="list-style-type: none"> <li>containing SignerInfo header <ul style="list-style-type: none"> <li>containing certificate <ul style="list-style-type: none"> <li>containing SecurityAttribute of type its_aid_ssp_list <ul style="list-style-type: none"> <li>containing ItsAidSsp item <ul style="list-style-type: none"> <li>containing its_aid <ul style="list-style-type: none"> <li>indicating 137</li> </ul> </li> <li>and containing service_specific_permissions <ul style="list-style-type: none"> <li>containing first octet <ul style="list-style-type: none"> <li>indicating 01h</li> </ul> </li> <li>and containing second octet <ul style="list-style-type: none"> <li>indicating 78h</li> </ul> </li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT discards the SPATEM</li> </ul> </li></ul></li></ul>	

<b>TP Id</b>	TP_IS_TLM_SSP_RCV_BV_09
<b>Summary</b>	Check that the IUT accepts the SPATEM message containing IntersectionState without additional information permitted by the signing certificate
<b>Reference</b>	ETSI TS 103 301 [2], clause 5.4.3.2
<b>PICS Selection</b>	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT is operating in secured mode  and the IUT is able to process received SPATEM  ensure that  when  the IUT receives SPATEM  containing spat.intersections  containing any items of type IntersectionState  not containing manoeuvreAssistList  and not containing regional  and containing states  containing any item of type MovementEvent  not containing speeds  and not containing manoeuvreAssistList  and not containing regional  embedded in GeoNetworking packet  containing SecurityHeader  containing SignerInfo header  containing certificate  containing SecurityAttribute of type its_aid_ssp_list  containing ItsAidSsp item  containing its_aid  indicating 137  and containing service_specific_permissions  containing first octet  indicating 01h  and containing second octet  indicating 80h  then  the IUT accepts the SPATEM</p>	

## 5.2.2 Road and Lane Topology (RLT) service

### 5.2.2.1 Check that RLT protocol version is set to 1

<b>TP Id</b>	TP_IS_RLT_MSGF_BV_01
<b>Summary</b>	Check that protocolVersion is set to 1 and messageID is set to 5
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.3
<b>PICS Selection</b>	PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  ensure that  when  a MAPEM is generated  then  the IUT sends a valid MAPEM  containing ITS PDU header  containing protocolVersion  indicating value '1'  and containing messageID  indicating value '5'</p>	

<b>TP Id</b>	TP_IS_RLT_MSGF_BV_02
<b>Summary</b>	Check that the IUT can successfully process all mandatory fields of MAPEM received
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.3
<b>PICS Selection</b>	PICS_MAPEM_RECEPTION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having receive a valid MAPEM  ensure that  when  the IUT receives a valid MAPEM  then  the IUT forwards the MAPEM content to upper layers  and the IUT forwards the MAPEM content to other facilities</p>	

### 5.2.2.2 Check the RLT message fragmenting

<b>TP Id</b>	TP_IS_RLT_EVGN_BV_01
<b>Summary</b>	Check that IVI Service generates a new MAPEM on reception of a valid AppMAPEM_Trigger request
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.4.1
<b>PICS Selection</b>	PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  ensure that  when  the IUT receives an AppMAPEM_Trigger request from the application layer  then  the IUT sends a valid MAPEM</p>	

<b>TP Id</b>	TP_IS_RLT_EVGN_BV_02
<b>Summary</b>	Check that RLT Service transmits new content
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.4.1
<b>PICS Selection</b>	PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  containing map  not containing LayerType  and not containing LayerID  and containing restrictionList  indicating the value RL_1  ensure that  when  the IUT is alerted about a new restrictionList indicating the value RL_2  then  the IUT sends a valid MAPEM  containing map  not containing LayerType  and not containing LayerID  and containing restrictionList  indicating indicating the value R_2</p>	

<b>TP Id</b>	TP_IS_RLT_EVGN_BV_03
<b>Summary</b>	Check that RLT Service transmits fragmented MAPEM when the message size exceeds the allowed message length
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.4.1
<b>PICS Selection</b>	PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  ensure that  when  the IUT is alerted about a new content  indicating a new value which exceeds the allowed message length  then  the IUT sends a first valid MAPEM  containing map  containing LayerType  and containing LayerID  indication a value LID_1  and the IUT sends a second valid MAPEM  containing map  containing LayerType  and containing LayerID  indication a value LID_2 = LID_1 + 1</p>	

### 5.2.2.3 Check continuous transmission with the SPAT messages

<b>TP Id</b>	TP_IS_RLT_COM_BV_01
<b>Summary</b>	Check that the RLT Service transmits continuously both MAPEM and SPATEM
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.4.3.1
<b>PICS Selection</b>	PICS_SPATEM_GENERATION AND PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  and the IUT has not sent any SPATEM yet  ensure that  when  the IUT receives an AppSPATEM_Start request from the application layer  then  the IUT sends a valid SPATEM  and the IUT sends a valid MAPEM</p>	

### 5.2.2.4 Check BTP type and port number

<b>TP Id</b>	TP_IS_RLT_COM_BV_02
<b>Summary</b>	Check that MAPEM uses BTP_B packet Check that the destination port for MAPEM is set to 2003
<b>Reference</b>	ETSI TS 103 301 [2], clauses 10.2 and 6.4.3.2
<b>PICS Selection</b>	PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  ensure that  when  a MAPEM is generated  then  the IUT sends a valid MAPEM  encapsulated in a BTP-B packet  containing a destination port value set to '2003'  and containing a destination port info value set to '0'</p>	

### 5.2.2.5 Check destination type

<b>TP Id</b>	TP_IS_RLT_COM_BV_03
<b>Summary</b>	Check that TLM service encapsulates MAPEM in a GBC with the HeaderType field set to the value of 4
<b>Reference</b>	ETSI TS 103 301 [2], clause 6.4.3.2
<b>PICS Selection</b>	PICS_MAPEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending MAPEM  ensure that  when  a MAPEM is generated  then  the IUT sends a valid MAPEM  encapsulated in a GBC packet  containing a correctly formatted Common Header  containing HeaderType field  indicating the value '4'</p>	

## 5.2.3 Infrastructure to Vehicle Information (IVI) service

### 5.2.3.1 Check that IVIM protocol version is set to 1

<b>TP Id</b>	TP_IS_IVI_MSGF_BV_02
<b>Summary</b>	Check that the IUT can successfully process all mandatory fields of IVIM
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.3
<b>PICS Selection</b>	PICS_IVIM_RECEPTION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having receive a valid IVIM  ensure that  when  the IUT receives a valid IVIM  then  the IUT forwards the IVI Mcontent to upper layers  and the IUT forwards the IVIM content to other facilities</p>	

<b>TP Id</b>	TP_IS_IVI_MSGF_SND_BV_01
<b>Summary</b>	Check that protocolVersion is set to 1 and messageID is set to 6
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.3
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending IVIM  ensure that  when  a IVIM is generated  then  the IUT sends a valid IVIM  containing ITS PDU header  containing protocolVersion  indicating value '1'  and containing messageID  indicating value '6'</p>	

### 5.2.3.2 Check that new ividentificationNumber value is generated for each new request

<b>TP Id</b>	TP_IS_IVI_EVGN_BV_01
<b>Summary</b>	Check that IVI Service generates a new IVIM on reception of a valid AppIVIM_Trigger request
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.1
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with              the IUT being in the "initial state"</p> <p>ensure that              when                  the IUT receives an AppIVIM_Trigger request from the application layer              then                  the IUT sends a valid IVIM</p>	

<b>TP Id</b>	TP_IS_IVI_EVGN_BV_02
<b>Summary</b>	Check that a new ividentificationNumber value is assigned for each newly generated IVIM
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.1
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with              the IUT being in the "initial state"              and the IUT having generated several IVIM</p> <p>ensure that              when                  the IUT is requested to generate a new IVIM              then                  the IUT sends a valid IVIM                      containing ivi                      containing mandatory                      containing ividentificationNumber                      indicating an unused value</p>	

### 5.2.3.3 Check that the value of ividentificationNumber is not used recently

<b>TP Id</b>	TP_IS_IVI_EVGN_BV_03
<b>Summary</b>	Check that ividentificationNumber value is set to a next unused value each time an IVIM is detected
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.1
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with              the IUT being in the "initial state"              and the IUT having generated several IVIM              and the IUT having generated its last DENM                  containing ivi                  containing mandatory                  containing ividentificationNumber                  indicating IVI_ID_1              and no active IvILD being associated with ividentificationNumber IVI_ID_1 + 1</p> <p>ensure that              when                  the IUT is requested to generate a new IVIM              then                  the IUT sends a valid IVIM                      containing ivi                      containing mandatory                      containing ividentificationNumber                      indicating IVI_ID_1 + 1</p>	

## 5.2.3.4 Check that a new generated IVIM contains an iviStatus set to 'new'

<b>TP Id</b>	TP_IS_IVI_EVGN_BV_04
<b>Summary</b>	Check that a new generated IVIM contains an iviStatus set to 'new'
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  ensure that  when  the IUT is requested to generate a new IVIM  then  the IUT sends a valid IVIM  containing ivi  containing mandatory  containing iviStatus  indicating 'new'</p>	

## 5.2.3.5 Check that an updated IVIM contains an iviStatus set to 'update'

<b>TP Id</b>	TP_IS_IVI_EVUP_BV_01
<b>Summary</b>	Check that an updated IVIM contains an iviStatus set to 'update'
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_UPDATE
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having generated an event  containing ivi  containing mandatory  containing iviIdentificationNumber  indicating IVIM_ID_1  containing iviStatus  indicating 'new'</p> <p>ensure that  when  the IUT receives an AppIVIM_update request associated with IVIM_ID_1  then  the IUT sends a valid IVIM  containing ivi  containing mandatory  containing iviStatus  indicating 'update'</p>	

## 5.2.3.6 Check that an update can change or add the end time to the IVIM

<b>TP Id</b>	TP_IS_IVI_EVUP_BV_02
<b>Summary</b>	Check that an update can change the validity time to the IVIM - validTo information field
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an event containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>not containing validTo</li> <li>and containing iviStatus</li> <li>indicating 'update'</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives an AppIVIM_update indicating a validTo value VT_1</li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT sends a valid IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing validTo</li> <li>indicating VT_1</li> <li>and containing iviStatus</li> <li>indicating 'update'</li> </ul> </li> </ul> </li> </ul>	

<b>TP Id</b>	TP_IS_IVI_EVUP_BV_03
<b>Summary</b>	Check that an update can change the validity time to the IVIM - validFrom information field
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an event containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing validFrom</li> <li>indicating VT_1</li> <li>containing iviStatus</li> <li>indicating 'update'</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives an AppIVIM_update indicating a validTo value VT_2</li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT sends a valid IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing validFrom</li> <li>indicating VT_2</li> <li>containing iviStatus</li> <li>indicating 'update'</li> </ul> </li> </ul> </li> </ul>	

### 5.2.3.7 Check that the timeStamp is set to the current time when generating a new IVM or last change of information content (if iviStatus set to update)

<b>TP Id</b>	TP_IS_IVI_EVGN_BV_05
<b>Summary</b>	Check that the timeStamp is set to the current time when generating a new IVM
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"</p> <p>ensure that</p> <p>when  the IUT is requested to generate a new IVIM</p> <p>then  the IUT sends a valid IVIM  containing ivi  containing mandatory  containing timeStamp  indicating CLT  containing iviStatus  indicating 'new'</p>	

<b>TP Id</b>	TP_IS_IVI_EVUP_BV_04
<b>Summary</b>	Check that the timeStamp is set to the current time when generating an update with some change of information content
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_UPDATE
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having generated an event  containing ivi  containing mandatory  containing timeStamp  and containing iviStatus  indicating 'new'</p> <p>ensure that</p> <p>when  the IUT receives an AppIVIM_update</p> <p>then  the IUT sends a valid IVIM  containing ivi  containing mandatory  containing timeStamp  indicating CLT  containing iviStatus  indicating 'update'</p>	

## 5.2.3.8 Check that the ividentificationNumber remains unchanged IVIM is updated

<b>TP Id</b>	TP_IS_IVI_EVUP_BV_05
<b>Summary</b>	Check that the ividentificationNumber remains unchanged IVIM is updated
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_UPDATE
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an event containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing ividentificationNumber indicating IVIM_ID_1</li> <li>containing iviStatus indicating 'new'</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when the IUT receives an AppIVIM_update request associated with IVIM_ID_1</li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT sends a valid IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing ividentificationNumber indicating IVIM_ID_1</li> <li>and containing iviStatus indicating 'update'</li> </ul> </li> </ul>	

## 5.2.3.9 Check that IVIM are generated in respect of a pre-defined repetition interval

<b>TP Id</b>	TP_IS_IVIM_GFQ_TI_01
<b>Summary</b>	Check that IVIMs are not generated more frequently than T_GenIvimMin
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_T_GENIVIMMIN AND PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated several IVIM</li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when the IUT sends a IVIM</li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT does not send any IVIM before expiry of T_GenIvimMin</li> </ul>	

<b>TP Id</b>	TP_IS_IVIM_GFQ_TI_02
<b>Summary</b>	Check that IVIMs are not generated less frequently than T_GenIvimMax
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_T_GENIVIMMAX AND PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated several IVIM</li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when the IUT sends a IVIM</li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT sends another IVIM before expiry of T_GenIvimMax</li> </ul>	

### 5.2.3.10 Check that the IVI Service activates repetition under the request from the ITS-S application

<b>TP Id</b>	TP_IS_IVIM_EVRP_BV_01
<b>Summary</b>	Check that the IUT activates repetition on reception of a valid AppIVIM_Update request
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_UPDATE
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated several IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing ivIdentificationNumber</li> <li>indicating IVIM_ID_1</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives an AppIVIM_Update indicating 'repetition interval' RI_1</li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT sends IVIM with respect to the 'repetition interval' RI_1 <ul style="list-style-type: none"> <li>containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing ivIdentificationNumber</li> <li>indicating IVIM_ID_1</li> </ul> </li> </ul> </li> </ul> </li> </ul>	

<b>TP Id</b>	TP_IS_IVIM_EVRP_BV_02
<b>Summary</b>	Check that the IUT deactivates repetition on reception of a valid AppIVIM_Update request
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_UPDATE
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated several IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory</li> <li>containing ivIdentificationNumber</li> <li>indicating IVIM_ID_1</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives an AppIVIM_Update indicating 'repetition interval' 0</li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT stops sending IVIM associated with IVIM_ID_1</li> </ul> </li> </ul>	

### 5.2.3.11 Check that the IVI Service terminates IVM generation on validity duration expiry or on termination request

<b>TP Id</b>	TP_IS_IVIM_EVTR_BV_01
<b>Summary</b>	Check that the IUT terminates IVM generation on validity duration expiry
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory <ul style="list-style-type: none"> <li>containing ivIdentificationNumber indicating IVIM_ID_1</li> <li>and containing validTo <ul style="list-style-type: none"> <li>indicating CLT + 10 seconds</li> <li>and containing iviStatus</li> </ul> </li> </ul> </li> <li>indicating 'new'</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT is alerted of expiration of the time associated with validTo</li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT stops sending IVIM associated with IVIM_ID_1</li> </ul> </li> </ul>	

<b>TP Id</b>	TP_IS_IVIM_EVTR_BV_02
<b>Summary</b>	Check that the IUT terminates IVM generation on termination request
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory <ul style="list-style-type: none"> <li>containing ivIdentificationNumber indicating IVIM_ID_1</li> <li>and containing iviStatus</li> <li>indicating 'new'</li> </ul> </li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when <ul style="list-style-type: none"> <li>the IUT receives an AppIVIM_termination request associated with IVIM_ID_1</li> </ul> </li> <li>then <ul style="list-style-type: none"> <li>the IUT sends a valid IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory <ul style="list-style-type: none"> <li>containing ivIdentificationNumber indicating IVIM_ID_1</li> <li>containing iviStatus</li> <li>indicating 'termination'</li> </ul> </li> </ul> </li> </ul> </li> </ul>	

## 5.2.3.12 Check that the IVI Service terminates IVM generation on cancellation request

<b>TP Id</b>	TP_IS_IVIM_EVTR_BV_03
<b>Summary</b>	Check that the IUT terminates IVM generation on cancellation request
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVI_CANCELLATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory containing ividentificationNumber indicating IVIM_ID_1</li> <li>and containing serviceProviderId indicating IVIM_SP_1</li> <li>and containing iviStatus indicating 'new'</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when the IUT receives an AppIVIM_cancellation request associated with IVIM_ID_1</li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT sends a valid IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory containing ividentificationNumber indicating IVIM_ID_1</li> <li>and containing timeStamp indication IVM_CLT_1</li> <li>and containing iviStatus indicating 'cancellation'</li> </ul> </li> </ul>	

## 5.2.3.13 Check that the IVI Service terminates IVM generation on negation request

<b>TP Id</b>	TP_IS_IVIM_EVTR_BV_04
<b>Summary</b>	Check that the IUT terminates IVM generation on negation request
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.2
<b>PICS Selection</b>	PICS_IVI_NEGATION
<b>Expected behaviour</b>	
<p>with</p> <ul style="list-style-type: none"> <li>the IUT being in the "initial state"</li> <li>and the IUT having generated an event containing ivi <ul style="list-style-type: none"> <li>containing mandatory containing ividentificationNumber indicating IVIM_ID_1</li> <li>and containing serviceProviderId indicating IVIM_SP_1</li> <li>and containing iviStatus indicating 'update'</li> </ul> </li> </ul> <p>ensure that</p> <ul style="list-style-type: none"> <li>when the IUT receives an AppIVIM_termination request associated with IVIM_ID_1</li> </ul> <p>then</p> <ul style="list-style-type: none"> <li>the IUT sends a valid IVIM containing ivi <ul style="list-style-type: none"> <li>containing mandatory containing ividentificationNumber indicating IVIM_ID_1</li> <li>and containing serviceProviderId indicating IVIM_SP_1</li> <li>and containing iviStatus indicating 'negation'</li> </ul> </li> </ul>	

## 5.2.3.14 Check BTP type and port number

<b>TP Id</b>	TP_IS_IVI_COM_BV_01
<b>Summary</b>	Check that IVIM uses BTP_B packet Check that the destination port for IVIM is set to 2006
<b>Reference</b>	ETSI TS 103 301 [2], clauses 10.2 and 7.4.3.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending IVIM  ensure that  when  an IVIM is generated  then  the IUT sends a valid IVIM  encapsulated in a BTP-B packet  containing a destination port value set to '2006'  and containing a destination port info value set to '0'</p>	

## 5.2.3.15 Check destination type

<b>TP Id</b>	TP_IS_IVI_COM_BV_02
<b>Summary</b>	Check that TLM service encapsulates IVIM in a UNC with the HeaderType field set to the value of 2
<b>Reference</b>	ETSI TS 103 301 [2], clause 7.4.3.2
<b>PICS Selection</b>	PICS_IVIM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT sending IVIM  ensure that  when  a IVIM is generated  then  the IUT sends a valid IVIM  encapsulated in a UNC packet  containing a correctly formatted Common Header  containing HeaderType field  indicating the value '2'</p>	

## 5.2.4 Traffic Light Control (TLC) service

### 5.2.4.1 Check that SREM protocol version is set to 1

<b>TP Id</b>	TP_IS_TLC_MSGF_BV_01
<b>Summary</b>	Check that protocolVersion is set to 1 and messageID is set to 9 (ITS-S)
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.3
<b>PICS Selection</b>	PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"</p> <p>ensure that</p> <p>when  the IUT is requested to generate a new SREM</p> <p>then  the IUT sends a valid SREM  containing ITS PDU header  containing protocolVersion  indicating value '1'  and containing messageID  indicating value '9'</p>	

<b>TP Id</b>	TP_IS_TLC_MSGF_BV_03
<b>Summary</b>	Check that the IUT can successfully process all mandatory fields of SSEM received (ITS-S)
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.3
<b>PICS Selection</b>	PICS_SSEM_RECEPTION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having send a valid SREM</p> <p>ensure that</p> <p>when  the IUT receives a valid SSEM</p> <p>then  the IUT forwards the SSEM content to upper layers  and the IUT forwards the SSEM content to other facilities</p>	

### 5.2.4.2 Check that SSEM protocol version is set to 1

<b>TP Id</b>	TP_IS_TLC_MSGF_BV_02
<b>Summary</b>	Check that the IUT can successfully process all mandatory fields of SREM received (TLC-S)
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.3
<b>PICS Selection</b>	PICS_SREM_RECEPTION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"</p> <p>ensure that</p> <p>when  the IUT having receive a valid SREM</p> <p>then  the IUT forwards the SREM content to upper layers  and the IUT generates a SSEM</p>	

<b>TP Id</b>	TP_IS_TLC_MSGF_BV_04
<b>Summary</b>	Check that protocolVersion is set to 1 and messageID is set to 10 (TLC-S)
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.3
<b>PICS Selection</b>	PICS_SSEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  ensure that  when  the IUT having receive a valid SREM  then  the IUT sends a valid SSEM  containing ITS PDU header  containing protocolVersion  indicating value '1'  and containing messageID  indicating value '10'</p>	

#### 5.2.4.3 Check that the IUT identifies SREM with a unique request identifier

<b>TP Id</b>	TP_IS_TLC_EVGN_BV_01
<b>Summary</b>	Check that IVI Service generates a new SREM on reception of a valid AppSREM_Trigger request (ITS-S)
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.4.1
<b>PICS Selection</b>	PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  ensure that  when  the IUT receives an AppSREM_Trigger request from the application layer  then  the IUT sends a valid SREM</p>	

<b>TP Id</b>	TP_IS_TLC_EVGN_BV_02
<b>Summary</b>	Check that the IUT identifies SREM with a unique request identifier (ITS-S)
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.4.1
<b>PICS Selection</b>	PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having generated several SREM  ensure that  when  the IUT is requested to generate a new SREM  then  the IUT sends a valid SREM  containing srm  containing requests[0]  containing requestID  indicating an unused value</p>	

#### 5.2.4.4 Check that the IUT increments the sequenceNumber when a SREM update is generated

<b>TP Id</b>	TP_IS_TLC_EVUP_BV_01
<b>Summary</b>	Check that the IUT increments the sequenceNumber when a SREM update is generated
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.4.1
<b>PICS Selection</b>	PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  and the IUT having generate a SREM  containing srm  containing sequenceNumber  indicating SREM_SN_1  and containing requests[0]  containing request  containing requestID  indicating SREM_RID_1</p> <p>ensure that  when  the IUT receives an AppSREM_update request  then  the IUT sends a valid SREM  containing ssm  containing sequenceNumber  indicating SREM_SN_1+ 1  and containing requests[0]  containing request  containing requestID  indicating SREM_RID_1</p>	

#### 5.2.4.5 Check BTP type and port number

<b>TP Id</b>	TP_IS_TLC_COM_BV_01
<b>Summary</b>	Check that IVIM uses BTP_B packet Check that the destination port for IVIM is set to 2007
<b>Reference</b>	ETSI TS 103 301 [2], clauses 10.2 and 8.4.3.3
<b>PICS Selection</b>	PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"</p> <p>ensure that  when  the IUT receives an AppSREM_Trigger request from the application layer  then  the IUT sends a valid SREM  encapsulated in a BTP-B packet  containing a destination port value set to '2007'  and containing a destination port info value set to '0'</p>	

<b>TP Id</b>	TP_IS_TLC_COM_BV_02
<b>Summary</b>	Check that IVIM uses BTP_B packet Check that the destination port for IVIM is set to 2008
<b>Reference</b>	ETSI TS 103 301 [2], clauses 10.2 and 8.4.3.3
<b>PICS Selection</b>	PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  ensure that  when  the IUT having receive a valid SREM  then  the IUT sends a valid SSEM  encapsulated in a BTP-B packet  containing a destination port value set to '2008'  and containing a destination port info value set to '0'</p>	

#### 5.2.4.6 Check destination type

<b>TP Id</b>	TP_IS_TLC_COM_BV_03
<b>Summary</b>	Check that TLM service encapsulates SREM in a GBC with the HeaderType field set to the value of 4
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.4.3.3
<b>PICS Selection</b>	NOT PICS_SREM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  ensure that  when  the IUT receives an AppSREM_Trigger request from the application layer  then  the IUT sends a valid SREM  encapsulated in a GBC packet  containing a correctly formatted Common Header  containing HeaderType field  indicating the value '4'</p>	

<b>TP Id</b>	TP_IS_TLC_COM_BV_04
<b>Summary</b>	Check that TLM service encapsulates IVIM in a GBC with the HeaderType field set to the value of 4
<b>Reference</b>	ETSI TS 103 301 [2], clause 8.4.3.3
<b>PICS Selection</b>	PICS_SSEM_GENERATION
<b>Expected behaviour</b>	
<p>with  the IUT being in the "initial state"  ensure that  when  the IUT having receive a valid SREM  then  the IUT sends a valid SSEM  encapsulated in a GBC packet  containing a correctly formatted Common Header  containing HeaderType field  indicating the value '4'</p>	

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## History

<b>Document history</b>		
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