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Intelligent Transport Systems (ITS);
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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)".

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 SREM-SSEM and RTCMEM as defined in ETSI TS 103 301 [1] 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.

2 References

2.1 Normative references

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

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

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] ETSI TS 103 301 (V1.3.1) (2020-04): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Facilities layer protocols and communication requirements for infrastructure services".

[2] ETSI TS 103 191-1 (V1.3.1): "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".

[3] CEN ISO/TS 19091-2019: "Intelligent transport systems - Cooperative ITS - Using V2I and I2V communications for applications related to signalized intersections".

[4] CEN ISO/TS 19321-2015: "Intelligent transport systems - Cooperative ITS - Dictionary of in-vehicle information (IVI) data structures".

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".

[i.6] ISO/TS 3166-1: "Codes for the representation of names of countries and their subdivisions - Part 1: Country codes".

[i.7] ISO/TS 14823: "Traffic and travel information - Messages via media independent stationary dissemination systems - Graphic data dictionary for pre-trip and in-trip information dissemination systems".

[i.8] Vienna Convention.

[i.9] SAE J2540: "ITIS Phrase Lists (International Traveler Information Systems)".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in CEN ISO/TS 19091 [3], ISO/IEC 9646-1 [i.2] and in ISO/IEC 9646-7 [i.4] apply.

3.2 Symbols

Void.

3.3 Abbreviations

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

AID	Application Identifier
ATS	Abstract Test Suite
BTP	Basic Transport Protocol
BV	Valid test events for Behaviour tests
CAM	Co-operative Awareness Messages
GBC	GeoBroadcast
GNSS	Global Navigation Satellite System
GPC	GNSS positioning correction
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
IUT	Implementation Under Test
IUT	Implementation Under Test
IVI	Infrastructure to Vehicle Information
IVIM	IVI-message
MAPEM	MapData Messages
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RLT	Road and Lane Topology
RTCMEM	RTCM Message
RTL	Road Line Traffic
SPAT	Signal Phase And Timing
SPATEM	Signal Phase And Timing Messages
SREM	Signal Request Message
SSEM	Signal Response Message
SSP	Service Specific Permissions

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

4.1.1 Test groups

4.1.1.1 Introduction

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 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 CEN ISO/TS 19091 [3] and ETSI TS 103 301 [1].

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

4.2.1 Test groups

4.2.1.1 Introduction

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 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 [1].

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

4.3.1 Test groups

4.3.1.1 Introduction

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 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 [1].

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.

4.4 Structure for RTCMEM tests

4.4.1 Test groups

4.4.1.1 Introduction

Table 4 shows the RTCMEM Test Suite Structure (TSS) including its subgroups defined for conformance testing.

Table 4: TSS for RTCMEM

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 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.

4.4.1.2 Root

The root identifies the RTCMEM given in ETSI TS 103 301 [1].

4.4.1.3 Groups

This level contains two functional areas identified as:

- Message Dissemination
- Message Processing

4.4.1.4 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 5.

Table 5: TP naming convention

Identifier	TP_<root>_<dir>_<gr>_<x>_<nn>[_<v>]	Example	
	<root> = root	IS_TLM	TLM service
		IS_RLT	RLT service
		IS_IVI	IVI service
		IS_TLCR	TLC service (SREM)
		IS_TLCS	TLC service (SSEM)
		IS_GPC	GPC service
	<dir> = direction	GEN	Message Generation behavior
		RCV	Message Receiving behavior
	<gr> = group	MSGF	Message Dissemination
		EVUP	Event Update
		EVGN	Event Generation
		EVTR	Event Termination
		COM	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
		BO	Invalid behaviour tests
	<nn> = sequential number		01 to 99
	<v> = variant (optional)		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].

CEN ISO/TS 19091 [3] 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 CEN ISO/TS 19091 [3], CEN ISO/TS 19321 [4] and ETSI TS 103 301 [1].

5.1.5 Mnemonics for PICS reference

To avoid an update of all TPs when the PICS document is changed, table 6 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 [2]. The 'PICS item' as defined in ETSI TS 103 191-1 [2] shall be used to determine the test applicability.

Table 6: 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

Mnemonic	PICS item
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_GPC_GENERATION	A.6/1
PICS_GPC_RECEPTION	A.6/2
PICS_IS_IUT_SECURED	A.1/1
PICS_T_GENIVIMMIN	A.4/1
PICS_T_GENIVIMMAX	A.4/2
PICS_SHORT_RANGE	A.1/2

5.2 Requirements

5.2.1 Traffic Light Manoeuvre (TLM) service

5.2.1.1 Initial conditions

According to CEN ISO/TS 19091 [3], clauses 6.7, the IUT shall conform to the following initial conditions:

```
the IUT has a roadway geometric information (MAP)
    containing the configuration of the target intersection (TI)
        containing the approach information (AI)
the IUT is authorized to send SPATEM
```

These conditions constitute the "SPATEM initial state".

5.2.1.2 Check the TLM message format

5.2.1.2.1 Check the TLM message protocol version

TP Id	TP_IS_TLM_GEN_MSGF_BV_01
Summary	Check that protocolVersion is set to 1 and messageID is set to 4
Reference	ETSI TS 103 301 [1], clause 5.3
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
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'	

5.2.1.2.2 Check the TLM message content

TP Id	TP_IS_TLM_GEN_MSGF_BV_02
Summary	An IUT shall include the unique identifier for the intersection as part of the signal phase and timing message broadcast
Reference	CEN ISO/TS 19091 [3], clauses 6.7.3 and G
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id
indicating unique intersection identifier

TP Id	TP_IS_TLM_GEN_MSGF_BV_03
Summary	Check that TLM service generates a SPAT message with the revision data element synchronized with the revision data element in the intersection configuration of the roadway geometric information (MAP)
Reference	CEN ISO/TS 19091 [3], clause G.4
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcastet MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing revision
indicating (***R***)
ensure that
when
the TLM service is requested to send a SPATEM
containing id of type IntersectionReferenceID
indicating ***ID***
then
the IUT sends a valid SPATEM
containing the elements of type IntersectionState
containing revision
indicating ***R***

TP Id	TP_IS_TLM_GEN_MSGF_BV_04
Summary	An IUT shall include a timestamp as part of the signal phase and timing message broadcast
Reference	CEN ISO/TS 19091 [3], clauses 6.7.5 and G
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending SPATEM ensure that when the TLM service is requested to send a SPATEM then the IUT sends a valid SPATEM containing spat containing intersections containing elements of type IntersectionState containing moy indicating the minute of the year when message was generated containing timeStamp indicating the millisecond of the current minute	

TP Id	TP_IS_TLM_GEN_MSGF_BV_05
Summary	An IUT shall include signalGroupe for each intersection if this signalGroup is defined in the intersection configuration of the roadway geometric information (MAP)
Reference	CEN ISO/TS 19091 [3], clause 6.7.6
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT is sending SPATEM and the last broadcasted MAPEM is containing id of type IntersectionReferenceID indicating ***ID*** and containing elements of type IntersectionGeometry containing laneSet containing elements of type GenericLane containing connectsTo containing elements of type Connection containing signalGroup indicating (**SG**) ensure that when the TLM service is requested to send a SPATEM containing id of type IntersectionReferenceID indicating ***ID*** then the IUT sends a valid SPATEM containing elements of type IntersectionState containing spat containing intersections containing as many elements of type IntersectionState as needed containing states containing as many elements of type MovementState as needed containing signalGroup indicating **SG**	

TP Id	TP_IS_TLM_GEN_MSGF_BV_06
Summary	For each vehicular manoeuvre at a signalized intersection, an IUT shall include the current movement state
Reference	CEN ISO/TS 19091 [3], clause 6.7.8
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing vehicle
and containing connectsTo
containing elements of type Connection
containing signalGroup
indicating (**SG**)
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing states
containing elements of type MovementState
containing signalGroup
indicating **SG**
containing state-time-speed
containing elements of type MovementEvent
not containing timing
or containing timing
indicating time interval containing current time

TP Id	TP_IS_TLM_GEN_MSGF_BV_07
Summary	For each pedestrian manoeuvre at a signalized intersection, an IUT shall include the current movement state
Reference	CEN ISO/TS 19091 [3], clause 6.7.9
PICS Selection	PICS_SPATEM_GENERATION AND PICS_PEDESTRIAN_MANOEUVRES

Expected behaviour

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing crosswalk
or containing sidewalk
and containing connectsTo
containing elements of type Connection
containing signalGroup
indicating (**SG**)
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing states
containing elements of type MovementState
containing signalGroup
indicating **SG**
containing state-time-speed
containing elements of type MovementEvent
not containing timing
or containing timing
indicating time interval containing current time

5.2.1.2.3 Check the TLM message timing information

TP Id	TP_IS_TLM_GEN_MSGF_BV_08
Summary	For each active manoeuvre an IUT shall include the earliest time point when the manoeuvre state is predicted to change
Reference	CEN ISO/TS 19091 [3], clause 6.7.11
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing vehicle
and containing connectsTo
containing elements of type Connection
containing signalGroup
indicating (**SG**)
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing states
containing elements of type MovementState
containing signalGroup
indicating **SG**
and containing state-time-speed
containing 1st element of type MovementEvent
containing timing
containing minEndTime
indicating the earliest time point when state can be changed

TP Id	TP_IS_TLM_GEN_MSGF_BV_09
Summary	For each manoeuvre at a signalized intersection, an IUT shall include: • the next expected movement states pertaining to that manoeuvre • the time point for when the succeeding manoeuvre state is predicted to change • the start time for each pending manoeuvre
Reference	CEN ISO/TS 19091 [3], clauses 6.7.13 and 6.7.14
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SPATEM_HAS_TIMING
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing vehicle
and containing connectsTo
containing elements of type Connection
containing signalGroup
indicating (**SG**)
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing states
containing elements of type MovementState
containing signalGroup
indicating **SG**
and containing state-time-speed
containing elements of type MovementEvent [1..N]
containing timing
containing minEndTime
indicating the earliest time point when state ends
and optionally containing startTime
indicating time point when state starts
and containing nextTime
indicating time point when the manoeuvre will next be permitted

5.2.1.2.4 Check the TLM messge prioretization

TP Id	TP_IS_TLM_GEN_MSGF_BV_10
Summary	Check that SPAT message prioritization is encoded using regional extension
Reference	CEN ISO/TS 19091 [3], clauses G.5.1.4 and G.8.2.5.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SPATEM_PRIORITIZATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending SPATEM and the IUT received CAM containing stationId indicating (***PrioSID***) triggerring the prioritization request ensure that when the TLM service is requested to send a SPATEM containing prioritization response then the IUT sends a valid SPATEM containing spat containing intersections containing elements of type IntersectionState containing id of type IntersectionReferenceID indicating ***ID*** and containing regional containing element of type IntersectionState-addGrpC containing activePrioritizations containing stationID indicating ***PrioSID*** and containing priorState indicating prioritization request status	

5.2.1.2.5 Check the TLM pedestrian and bicycle indication

TP Id	TP_IS_TLM_GEN_MSGF_BV_11
Summary	For each manoeuvre at a signalized intersection, an IUT shall indicate if one or more pedestrians have been detected in the pedestrian crossing
Reference	CEN ISO/TS 19091 [3], clause 6.7.16
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SPATEM_PEDESTRIAN_MANOEUVRES
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing vehicle
and containing connectsTo
containing elements of type Connection
containing connectionID **(CONN_ID)**

ensure that
when
the TLM service is requested to send a SPATEM
indicating presence of pedestrians on the signalized intersection
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing maneuverAssistList
containing elements of type ConnectionManeuverAssist
containing connectionID
indicating **CONN_ID**
and containing pedBicycleDetect
indicating true

5.2.1.2.6 Check the TLM optimal speed indication

TP Id	TP_IS_TLM_GEN_MSGF_BV_12
Summary	An IUT shall transmit information about the optimal speed for vehicles on each lane
Reference	CEN ISO/TS 19091 [3], clause 6.7.18
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SPATEM_HAS_OPTIMAL_SPEED
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing vehicle
and containing connectsTo
containing elements of type Connection
containing signalGroup
indicating (**SG**)
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing states
containing elements of type MovementState
containing signalGroup
indicating **SG**
and containing state-time-speed
containing elements of type MovementEvent
containing speeds
containing element of type AdvisorySpeed
containing type
indicating ecoDrive or transit
and containing speed
indicating optimal speed

TP Id	TP_IS_TLM_GEN_MSGF_BV_13
Summary	An IUT shall transmit information about the signal timing progression speed along the roadway
Reference	CEN ISO/TS 19091 [3], clause 6.7.19
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SPATEM_HAS_SIGNAL_PROGRESSION_SPEED
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending SPATEM
and the last broadcasted MAPEM is
containing id of type IntersectionReferenceID
indicating ***ID***
and containing elements of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneAttributes
containing laneType
containing vehicle
and containing connectsTo
containing elements of type Connection
containing signalGroup
indicating (**SG**)
ensure that
when
the TLM service is requested to send a SPATEM
then
the IUT sends a valid SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing id of type IntersectionReferenceID
indicating ***ID***
and containing states
containing elements of type MovementState
containing signalGroup
indicating **SG**
and containing state-time-speed
containing elements of type MovementEvent
containing speeds
containing element of type AdvisorySpeed
containing type
indicating greenwave
and containing speed
indicating the signal timing progression speed

5.2.1.2.7 Check the TLM egress lane queue and storage availability

TP Id	TP_IS_TLM_GEN_MSGF_BV_14
Summary	An IUT shall transmit the length of the queue and the length of available vehicular storage on each egress lane
Reference	CEN ISO/TS 19091 [3], clauses 6.7.20 and 6.7.21
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SPATEM_HAS_EGRESS_QUEUE
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending SPATEM and the last broadcasted MAPEM is containing id of type IntersectionReferenceID indicating ***ID*** and containing elements of type IntersectionGeometry containing laneSet containing elements of type GenericLane containing laneAttributes containing laneType containing vehicle ensure that when the TLM service is requested to send a SPATEM then the IUT sends a valid SPATEM containing spat containing intersections containing elements of type IntersectionState containing id of type IntersectionReferenceID indicating ***ID*** and containing maneuverAssistList containing elements of type ConnectionManeuverAssist containing queueLength indicating current length of the queue and containing availableStorageLength indicating available space for the line queue	

5.2.1.3 TLM service trigger, update, repetition and termination

TP Id	TP_IS_TLM_GEN_EVGN_BV_01
Summary	Check that TLM Service generates a new SPATEM on reception of a valid AppSPATEM_Start request
Reference	ETSI TS 103 301 [1], clause 5.4.2
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
with the IUT being in the "SPATEM initial state" 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	

TP Id	TP_IS_TLM_GEN_EVGN_BV_02
Summary	Check that TLM Service generates SPATEM are time ordered
Reference	ETSI TS 103 301 [1], clause 5.4.2
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT has sent a SPATEM ensure that when several SPATEM are generated then the IUT sends SPATEM in time order	

TP Id	TP_IS_TLM_GEN_EVGN_BV_03
Summary	Check that TLM Service terminates on reception of a valid AppSPATEM_Stop request
Reference	ETSI TS 103 301 [1], clause 5.4.2
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending SPATEM ensure that when the IUT receives an AppSPATEM_Stop request from the application layer then the IUT stops sending SPATEM	

TP Id	TP_IS_TLM_GEN_EVGN_BV_04
Summary	Check that TLM Service generates a new SPATEM on reception of a valid AppSPATEM_Trigger request
Reference	ETSI TS 103 301 [1], clause 5.4.2
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" ensure that when the IUT receives an AppSPATEM_Trigger request from the application layer then the IUT sends a valid SPATEM	

5.2.1.4 Check presence of destination area

TP Id	TP_IS_TLM_GEN_COM_BV_01
Summary	Check that TLM Service provides the destination area in SPATEM
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SHORT_RANGE
Expected behaviour	
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 spat containing regional containing at least on region indicating a regionId and indication a regExtValue	

5.2.1.5 Check BTP type and port number

TP Id	TP_IS_TLM_GEN_COM_BV_02
Summary	Check that SPATEM uses BTP_B packet Check that the destination port for SPATEM is set to 2004
Reference	ETSI TS 103 301 [1], clauses 10.2 and 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_SHORT_RANGE
Expected behaviour	
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 BTP-B packet containing a destination port value set to 2004 and containing a destination port info value set to 0	

5.2.1.6 Check destination type

TP Id	TP_IS_TLM_GEN_COM_BV_03
Summary	Check that TLM service encapsulates SPATEM in a GBC with the HeaderType field set to the value of 4
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION
Expected behaviour	
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'	

5.2.1.7 TLM security parameters

5.2.1.7.1 Check TLM ITS AID value

TP Id	TP_IS_TLM_GEN_SEC_BV_01
Summary	Check that TLM service uses certificate containing valid ITS AID to sign SPATEM messages
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM 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 as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_SPATEM**	

TP Id	TP_IS_TLM_GEN_SEC_BV_02
Summary	Check that TLM service uses generic security profile to sign SPATEM message and does not include additional security header elements
Reference	ETSI TS 103 301 [1], clause 12
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM 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 as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_SPATEM** and containing generationTime indicating realistic generation time and optionally containing generationLocation and not containing other header items	

5.2.1.7.2 Check TLM SSP version

TP Id	TP_IS_TLM_GEN_SSP_BV_01
Summary	Check that TLM service uses certificate containing valid Service Specific Permissions of type BitmapSsp to sign SPATEM messages and the SSP version is set to 1
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SPATEM not containing intersection states and not containing prioritization and not containing manoeuvre assist information then the IUT sends a SPATEM signed with the **CERT_SPAT_SSP_NONE**	

5.2.1.7.3 Check TLM Service specific parameters

5.2.1.7.3.1 SSP IntersectionState

TP Id	TP_IS_TLM_GEN_SSP_BV_02
Summary	Check that TLM service sends a SPAT message containing IntersectionState without prioritization and manoeuvre assist information when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_ALL** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 8 set to 1 ensure that when the IUT is requested to generate a SPATEM not containing prioritization and manoeuvre assist information then the IUT sends a SPATEM signed with the **CERT_SPAT_SSP_ALL**	

TP Id	TP_IS_TLM_GEN_SSP_BO_03
Summary	Check that TLM service does not send a SPAT message containing IntersectionState if it is not permitted by the certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_NONE** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SPATEM containing intersections state then the IUT does not send a SPATEM	

5.2.1.7.3.2 Public transport prioritization status response SSP

TP Id	TP_IS_TLM_GEN_SSP_BV_04
Summary	Check that TLM service sends a SPAT message containing public transport prioritization response when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_ALL** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 9 set to 1 ensure that when the IUT is requested to generate a SPATEM containing public transport prioritization respond then the IUT sends a SPATEM signed with the **CERT_SPAT_SSP_ALL**	

TP Id	TP_IS_TLM_GEN_SSP_BO_05
Summary	Check that TLM service does not send a SPAT message containing IntersectionState if it is not permitted by the certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 9 set to 0 ensure that when the IUT is requested to generate a SPATEM containing public transport prioritization respond then the IUT does not sends a SPATEM	

5.2.1.7.3.3 Maneuver assisting information SSP

TP Id	TP_IS_TLM_GEN_SSP_BV_06
Summary	Check that TLM service sends a SPAT message containing Intersection maneuver assisting information when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_ALL** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 10 set to 1 ensure that when the IUT is requested to generate a SPATEM containing spat.intersections.IntersectionState.maneuverAssistList then the IUT sends a SPATEM signed with the **CERT_SPAT_SSP_ALL**	

TP Id	TP_IS_TLM_GEN_SSP_BV_07
Summary	Check that TLM service sends a SPAT message containing movement state maneuver assisting information when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_ALL** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 10 set to 1 ensure that when the IUT is requested to generate a SPATEM containing spat.intersections.IntersectionState.states.MovementState.maneuverAssistList then the IUT sends a SPATEM signed with the **CERT_SPAT_SSP_ALL**	

TP Id	TP_IS_TLM_GEN_SSP_BO_08
Summary	Check that TLM service does not send a SPAT message containing intersection maneuver assisting information if it is not permitted by the certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 10 set to 0 ensure that when the IUT is requested to generate a SPATEM containing spat.intersections.IntersectionState.maneuverAssistList then the IUT does not sends a SPATEM	

TP Id	TP_IS_TLM_GEN_SSP_BO_09
Summary	Check that TLM service does not send a SPAT message containing movement state maneuver assisting information if it is not permitted by the certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SPATEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SPATEM with the certificate **CERT_SPAT_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 10 set to 0 ensure that when the IUT is requested to generate a SPATEM containing spat.intersections.IntersectionState.states.MovementState.maneuverAssistList then the IUT does not sends a SPATEM	

5.2.1.8 Check the TLM message transmission rate requirements

TP Id	TP_IS_TLM_GEN_RATE_BV_01
Summary	Check that the IUT transmits SPATEM with valid transmission rate
Reference	CEN ISO/TS 19091 [3], clauses 6.17
PICS Selection	PICS_SPATEM_GENERTION AND PICS_SPATEM_TRANSMISSION_RATE
Expected behaviour	
with the IUT being in the "SPATEM initial state" the IUT has sent SPATEM message at TIME_1 ensure that when IUT is triggered to send a next SPATEM then the IUT sends SPATEM at TIME_2 indicating DELTA = TIME_2 - TIME_1 where DELTA is less than 2 second and more then 100 ms	

5.2.1.9 Check TLM message reception

TP Id	TP_IS_TLM_RCV_MSGF_BV_01
Summary	Check that the IUT can successfully process all mandatory fields of SPATEM received
Reference	ETSI TS 103 301 [1], clause 5.3
PICS Selection	PICS_SPATEM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" 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	

TP Id	TP_IS_TLM_RCV_SEC_BV_01
Summary	Check that the IUT accepts the SPATEM message permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SPATEM containing spat not containing intersections containing any elements of type IntersectionState containing states not containing any element and not containing regional and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_SPATEM** then the IUT accepts the received SPATEM	

TP Id	TP_IS_TLM_RCV_SEC_BO_01
Summary	Check that the IUT discards the SPATEM message not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SPATEM containing spat containing intersections containing elements of type IntersectionState containing states not containing any element and not containing regional and signed with the certificate not containing appPermission item containing psid indicating **ITS_AID_SPATEM** then the IUT discards the received SPATEM	

TP Id	TP_IS_TLM_RCV_SSP_BV_01
Summary	Check that the IUT accepts the SPATEM message containing IntersectionState without additional information permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SPATEM containing spat containing intersections containing elements of type IntersectionState containing states not containing elements of type MovementState containing maneuverAssistList and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_SPATEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 8 set to 1 then the IUT accepts the received SPATEM	

TP Id	TP_IS_TLM_RCV_SSP_BO_02
Summary	Check that the IUT discards the SPATEM message containing IntersectionState without additional information not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SPATEM containing spat containing intersections containing elements of type IntersectionState containing states not containing elements of type MovementState containing maneuverAssistList and not containing maneuverAssistList and not containing regional and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_SPATEM** and containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 8 set to 0 then the IUT discards the received SPATEM	

TP Id	TP_IS_TLM_RCV_SSP_BV_03
Summary	Check that the IUT accepts the SPATEM message containing IntersectionState with public transport prioritization response permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
ensure that
when
the IUT receives a SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing states
not containing elements of type MovementState
containing maneuverAssistList
and not containing maneuverAssistList
and containing regional
containing element of type IntersectionState-aggGrpC
containing activePrioritizations
and signed with the certificate
containing appPermission item
containing psid
indicating ITS_AID_SPATEM
and containing bitmapSSP
indicating octet at position 0 set to 0x01
and indicating bit at position 9 set to 1
then
the IUT accepts the received SPATEM

TP Id	TP_IS_TLM_RCV_SSP_BO_04
Summary	Check that the IUT discards the SPATEM message containing IntersectionState with public transport prioritization response not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
ensure that
when
the IUT receives a SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing states
not containing elements of type MovementState
containing maneuverAssistList
and not containing maneuverAssistList
and containing regional
containing element of type IntersectionState-aggGrpC
containing activePrioritizations
and signed with the certificate
containing appPermission item
containing psid
indicating **ITS_AID_SPATEM**
and containing bitmapSSP
indicating octet at position 0 set to 0x01
and indicating bit at position 9 set to 0
then
the IUT discards the received SPATEM

TP Id	TP_IS_TLM_RCV_SSP_BV_05
Summary	Check that the IUT accepts the SPATEM message containing IntersectionState with manoeuvre assist information permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
ensure that
when
the IUT receives a SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing maneuverAssistList
and not containing regional
and signed with the certificate
containing appPermission item
containing psid
indicating **ITS_AID_SPATEM**
and containing bitmapSSP
indicating octet at position 0 set to 0x01
and indicating bit at position 10 set to 1
then
the IUT accepts the received SPATEM

TP Id	TP_IS_TLM_RCV_SSP_BO_06
Summary	Check that the IUT discards the SPATEM message containing IntersectionState with manoeuvre assist information permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_SPATEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
ensure that
when
the IUT receives a SPATEM
containing spat
containing intersections
containing elements of type IntersectionState
containing maneuverAssistList
and not containing regional
and signed with the certificate
containing appPermission item
containing psid
indicating **ITS_AID_SPATEM**
and containing bitmapSSP
indicating octet at position 0 set to 0x01
and indicating bit at position 10 set to 0
then
the IUT discards the received SPATEM

5.2.2 Road and Lane Topology (RLT) service

5.2.2.1 Check that RLT message format

5.2.2.1.1 Check that RLT protocol version is set to 1

TP Id	TP_IS_RLT_GEN_MSGF_BV_01
Summary	Check that protocolVersion is set to 1 and messageID is set to 5
Reference	ETSI TS 103 301 [1], clause 6.3
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
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'	

5.2.2.1.2 Check the RLT message content

5.2.2.1.2.1 Check the message revision number

TP Id	TP_IS_RLT_GEN_MSGF_BV_02
Summary	Check that the intersection information revision number is changed when the intersection configuration is changed
Reference	CEN ISO/TS 19091 [3], clause 6.5.13
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT already sent MAPEM containing id of type IntersectionReferenceID indicating ***ID*** and containing elements of type IntersectionGeometry containing revision indicating value ***R*** ensure that when the IUT is triggered to send the MAPEM containing new configuration of the intersection then the IUT sends MAPEM containing id of type IntersectionReferenceID indicating ***ID*** and containing the element of type IntersectionGeometry containing revision indicating value ***R+1***	

TP Id	TP_IS_RLT_GEN_MSGF_BV_03
Summary	Check that the intersection information revision number is not changed when the intersection configuration is still the same
Reference	CEN ISO/TS 19091 [3], clause 6.5.13
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT already sent MAPEM containing id of type IntersectionReferenceID indicating ***ID*** and containing elements of type IntersectionGeometry containing revision indicating value ***R*** ensure that when the IUT is triggered to send the MAPEM containing the same configuration of the intersection then the IUT sends MAPEM containing id of type IntersectionReferenceID indicating ***ID*** and containing the element of type IntersectionGeometry containing revision indicating value ***R***	

5.2.2.1.2.2 Check the message connection trajectories

TP Id	TP_IS_RLT_GEN_MSGF_BV_04
Summary	Check that RLT Service transmits MAPEM with the valid connection trajectories
Reference	CEN ISO/TS 19091 [3], clause G.8.2.3.4
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending MAPEM ensure that when a MAPEM is generated containing MapData data element containing intersections containing elements of type IntersectionGeometry containing laneSet containing elements of type GenericLane containing regional containing elements of type ConnectionTrajectory then the first node of the trajectory indicate the position related to the node of ingress lane and the last node of the trajectory indicate the position identical to the first node of the connected egress lane	

5.2.2.1.2.3 Check the altitude encoding

TP Id	TP_IS_RLT_GEN_MSGF_BV_05
Summary	Check that reference point altitude is encoded using regional extension
Reference	CEN ISO/TS 19091 [3], clause G.8.2.6
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "MAPEM initial state" ensure that when the IUT is triggered to send the MAPEM containing reference position containing altitude information ***ALTITUDE*** then the IUT sends MAPEM containing map.intersections containing the element of type IntersectionGeometry containing refPoint not containing elevation and containing regional containing element of type Position3D-addGrpC containing altitude indicating ***ALTITUDE***	

5.2.2.1.2.4 Check lanes configuration

TP Id	TP_IS_RLT_GEN_MSGF_BV_06
Summary	Check that each lane of the intersection contains a unique number
Reference	CEN ISO/TS 19091 [3], clause 6.5.8
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "MAPEM initial state" ensure that when the IUT is triggered to send the MAPEM containing intersections containing multiple lines then the IUT sends MAPEM containing map.intersections containing the element of type IntersectionGeometry containing laneSet containing elements of type GenericLane containing laneID indicating unique value	

TP Id	TP_IS_RLT_GEN_MSGF_BV_07
Summary	Check that the number of nodes needed to represent the path of a lane is selected such that the perpendicular distance between the lane centre line and the straight line connecting the two consecutive nodes is less than 1 m
Reference	CEN ISO/TS 19091 [3], clause 6.5.9
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "MAPEM initial state" ensure that when the IUT is triggered to send the MAPEM containing intersections containing multiple lines then the IUT sends MAPEM containing map.intersections containing the element of type IntersectionGeometry containing laneSet containing elements of type GenericLane containing nodeList containing nodes containing enough elements indicating precise lane path	

5.2.2.1.2.5 Check valid manoeuvres and user types for various lanes

TP Id	TP_IS_RLT_GEN_MSGF_BV_08
Summary	Check that each vehicular lane of the intersection includes only allowed manoeuvres and vehicle types
Reference	CEN ISO/TS 19091 [3], clause 6.5.10
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	

with
the IUT being in the "MAPEM initial state"
ensure that
when
the IUT is triggered to send the MAPEM
containing intersection
containing vehicle lane
containing laneID (***LANE_ID***)
then
the IUT sends MAPEM
containing map.intersections
containing the element of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing laneAttributes
containing laneType
containing vehicle
not indicating any flags
or indicating isVehicleFlyOverLane
or indicating hovLaneUseOnly
and containing sharedWith
not indicating any flags
indicating otherNonMotorizedTrafficTypes (2)
and/or indicating pedestriansTraffic (6)
and/or indicating cyclistVehicleTraffic (7)
and/or indicating pedestrianTraffic (9)
and/or containing connectsTo
containing elements of type Connection
containing connectingLane
containing maneuver
indicating maneuverStraightAllowed
or indicating maneuverLeftAllowed
or indicating maneuverRightAllowed
or indicating maneuverUTurnAllowed
or indicating maneuverLeftTurnOnRedAllowed
or indicating maneuverRightTurnOnRedAllowed
or not containing maneuvre
or containing element of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing overlays
indicating list of lanes to be used for the present TP

TP Id	TP_IS_RLT_GEN_MSGF_BV_09
Summary	Check that each pedestrian lane of the intersection includes only allowed manoeuvres and user types
Reference	CEN ISO/TS 19091 [3], clause 6.5.11
PICS Selection	PICS_MAPEM_GENERATION AND PICS_PEDESTRIAN_MANOEUVRES

Expected behaviour

with
the IUT being in the "MAPEM initial state"
ensure that
when
the IUT is triggered to send the MAPEM
containing intersection
containing pedestrian lane
containing laneID (***LANE_ID***)
then
the IUT sends MAPEM
containing map.intersections
containing the element of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing laneAttributes
containing laneType
containing crosswalk
or containing bikeLane
or containing sidewalk
and containing sharedWith
indicating otherNonMotorizedTrafficTypes (2)
or indicating pedestriansTraffic (6)
or indicating cyclistVehicleTraffic (7)
or indicating pedestrianTraffic (9)
or not indicating any value
and containing connectsTo
containing elements of type Connection
containing connectingLane
containing maneuver
indicating maneuverStraightAllowed
or not containing maneuver
or containing element of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing overlays
indicating list of lanes to be used for the present TP

TP Id	TP_IS_RLT_GEN_MSGF_BV_10
Summary	Check that each special lane of the intersection includes only allowed manoeuvres and user types
Reference	CEN ISO/TS 19091 [3], clause 6.5.12
PICS Selection	PICS_MAPEM_GENERATION AND PICS_SPECIALIZED_CARS_MANOEUVRES

Expected behaviour

with
the IUT being in the "MAPEM initial state"
ensure that
when
the IUT is triggered to send the MAPEM
containing intersection
containing special transport lane
containing laneID (***LANE_ID***)
then
the IUT sends MAPEM
containing map.intersections
containing the element of type IntersectionGeometry
containing laneSet
containing elements of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing laneAttributes
containing laneType
containing vehicle
indicating hovLaneUseOnly
or indicating restrictedToBusUse
or indicating restrictedFromPublicUse
or containing trackedVehicle
and containing connectsTo
containing elements of type Connection
containing connectingLane
containing maneuver
indicating maneuverStraightAllowed
or indicating goWithHalt
or not containing maneuver
or containing element of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing overlays
indicating list of lanes to be used for the present TP

TP Id	TP_IS_RLT_GEN_MSGF_BV_11
Summary	Check that each crosswalk lane of the intersection does not have ingress or egress approaches and includes only valid user types
Reference	CEN ISO/TS 19091 [3], clause 6.5.14
PICS Selection	PICS_MAPEM_GENERATION

Expected behaviour

with
the IUT being in the "MAPEM initial state"
ensure that
when
the IUT is triggered to send the MAPEM
containing intersection
containing crosswalk lane
containing laneID (***LANE_ID***)
then
the IUT sends MAPEM
containing map.intersections
containing the element of type IntersectionGeometry
containing laneSet
containing element of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing laneAttributes
containing laneType
containing crosswalk
and containing sharedWith
indicating otherNonMotorizedTrafficTypes (2)
or indicating pedestriansTraffic (6)
or indicating cyclistVehicleTraffic (7)
or indicating trackedVehicleTraffic (8)
or indicating pedestrianTraffic (9)
or not indicating any value
and not containing ingressApproach
and not containing egressApproach
or containing element of type GenericLane
containing laneID
indicating ***LANE_ID***
and containing overlays
indicating list of lanes to be used for the present TP

5.2.2.1.2.6 Check the lane width

TP Id	TP_IS_RLT_GEN_MSGF_BV_12
Summary	Check that each lane information contain lane width or default lane width is provided
Reference	CEN ISO/TS 19091 [3], clause 6.5.15
PICS Selection	PICS_MAPEM_GENERATION AND PICS_MAPEM_HAS_LANE_WIDTH
Expected behaviour	
with the IUT being in the "MAPEM initial state" ensure that when the IUT is triggered to send the MAPEM containing intersection containing lanes then the IUT sends MAPEM containing map.intersections containing all elements of type IntersectionGeometry containing laneWidth indicating default lane with or containing laneSet containing all elements of type GenericLane containing nodeList containing nodes containing all elements of type NodeXY containing attributes containing dWidth indicating lane with at the point	

TP Id	TP_IS_RLT_GEN_MSGF_BV_13
Summary	Check that default lane width is not included in the RTL message if each lane information contains lane width
Reference	CEN ISO/TS 19091 [3], clause 6.5.16
PICS Selection	PICS_MAPEM_GENERATION AND PICS_MAPEM_HAS_LANE_WIDTH
Expected behaviour	
with the IUT being in the "MAPEM initial state" ensure that when the IUT is triggered to send the MAPEM containing map.intersections containing all elements of type IntersectionGeometry containing laneSet containing all elements of type GenericLane containing nodeList containing nodes containing all elements of type NodeXY containing attributes containing dWidth indicating lane with at the point then the IUT sends MAPEM containing map.intersections containing all elements of type IntersectionGeometry not containing laneWidth	

5.2.2.1.2.7 Check lane connections

TP Id	TP_IS_RLT_GEN_MSGF_BV_14
Summary	Check that possible manoevers are encoded in connectsTo data element
Reference	CEN ISO/TS 19091 [3], clauses 6.5.17 and G.8.2.3.2
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending MAPEM ensure that when the RLT service is requested to send a MAPEM containing possible manoevers information then the IUT sends a MAPEM containing elements of type IntersectionGeometry containing laneSet containing elements of type GenericLane containing DE connectsTo containing information about possible manoeuvers	

TP Id	TP_IS_RLT_GEN_MSGF_BV_15
Summary	An IUT shall broadcast the signal group identifier, the lanes/approaches associated with the signal group, and the lanes/approaches' allowable manoeuvres
Reference	CEN ISO/TS 19091 [3], clause 6.5.21
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "MAPEM initial state" ensure that when the IUT is triggered to send the MAPEM containing intersection containing lanes containing signalGroup then the IUT sends MAPEM containing map.intersections containing all elements of type IntersectionGeometry containing laneSet containing all elements of type GenericLane containing connectsTo containing elements of type Connection containing signalGroup indicating (**SG**) and containing connectingLane containing maneuver indicating possible maneuver	

TP Id	TP_IS_RLT_GEN_MSGF_BV_16
Summary	Check that lanes which are crossed by a crosswalk shall use the same ingressApproach / egressApproach identifier
Reference	CEN ISO/TS 19091 [3], clause G.8.2.3.1
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending MAPEM ensure that when a MAPEM is generated containing MapData data element containing elements of type IntersectionGeometry containing more then one element of type GenericLane crossed by the same crosswalk lane then the IUT sends a MAPEM containing these lements of type GenericLane containing ingressApproach indicating the same value or containing egressApproach indicating the same value	

TP Id	TP_IS_RLT_GEN_MSGF_BV_17
Summary	Check that RLT Service transmits MAPEM without data elements not used in ETSI architecture: • layerType • dataParameters
Reference	CEN ISO/TS 19091 [3], clauses G.8.1.1 and G.8.2.1
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending MAPEM ensure that when a MAPEM is generated containing a new content indicating a value which is not exceeding the allowed message length then the IUT sends a MAPEM containing MapData data element not containing layerType and not containing layerID and not containing dataParameters containing elements of type IntersectionGeometry containing elements of type GenericLane not containing preemptPriorityData and not containing maneuvers and containing connectsTo containing elements of type Connection containing connectingLane not containing maneuver	

5.2.2.2 Check the RLT message fragmenting

TP Id	TP_IS_RLT_GEN_FRAG_BV_01
Summary	Check that RLT Service transmits non-fragmented MAPEM without the Layer ID
Reference	ETSI TS 103 301 [1], clause 6.4.1 CEN ISO/TS 19091 [3], clause G.8.3.1
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending MAPEM ensure that when the IUT is requested to send a MAPEM indicating a map structure which fits the allowed message length then the IUT sends a first MAPEM containing map not containing LayerID	

TP Id	TP_IS_RLT_GEN_FRAG_BV_02
Summary	Check that RLT Service transmits fragmented MAPEM when the message size exceeds the allowed message length
Reference	ETSI TS 103 301 [1], clause 6.4.1 CEN ISO/TS 19091 [3], clause G.8.3.1
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending MAPEM ensure that when the IUT is requested to send a MAPEM indicating a map structure which exceeds the allowed message length and shall be sent using **N** fragments then the IUT sends a first valid MAPEM containing map containing LayerID indication a value LID_1 = **N** * 10 + 1 and the IUT sends next MAPEM containing map containing LayerID indication a value $LID_n = LID_{n-1} + 1$	

Variants

Fragments count (N)	LID_1	LID_2	LID_N
2	21	22	22
3	31	32	33
4	41	42	44

5.2.2.3 Check continuous transmission with the SPATEM messages

TP Id	TP_IS_RLT_GEN_COM_BV_01
Summary	Check that the IUT transmits continuously both MAPEM and SPATEM
Reference	ETSI TS 103 301 [1], clause 6.4.3.1
PICS Selection	PICS_SPATEM_GENERATION AND PICS_MAPEM_GENERATION
Expected behaviour	
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	

TP Id	TP_IS_RLT_GEN_COM_BV_02
Summary	Check that RLT service generates a MAP message with the revision data element synchronized with the revision data element of correspondent SPATEM message
Reference	CEN ISO/TS 19091 [3], clause G.8.2.5.1
PICS Selection	PICS_SPATEM_GENERATION AND PICS_MAPEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT already sent MAPEM containing id of type IntersectionReferenceID indicating ***ID*** and containing elements of type IntersectionGeometry containing revision indicating value ***R*** and the IUT has sent SPATEM containing id of type IntersectionReferenceID indicating ***ID*** and containing elements of type IntersectionState containing revision indicating value ***R+1*** ensure that when the IUT is triggered to send the MAPEM containing the same configuration of the intersection then the IUT sends MAPEM containing the elements of type IntersectionGeometry containing revision indicating value ***R+1***	

5.2.2.4 Check BTP type and port number

TP Id	TP_IS_RLT_GEN_COM_BV_03
Summary	Check that MAPEM uses BTP_B packet Check that the destination port for MAPEM is set to 2003
Reference	ETSI TS 103 301 [1], clauses 10.2 and 6.4.3.2
PICS Selection	PICS_MAPEM_GENERATION
Expected behaviour	
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'	

5.2.2.5 Check destination type

TP Id	TP_IS_RLT_GEN_COM_BV_04
Summary	Check that TLM service encapsulates MAPEM in a GBC with the HeaderType field set to the value of 4
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_GENERATION AND PICS_SHORT_RANGE
Expected behaviour	
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'	

5.2.2.6 RLT security parameters

5.2.2.6.1 Check RLT ITS AID value

TP Id	TP_IS_RLT_GEN_SEC_BV_01
Summary	Check that RLT service uses certificate containing valid ITS AID to sign MAPEM messages
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT sending MAPEM ensure that when an IUT is triggered to send a MAPEM then the IUT sends a valid MAPEM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_MAPEM**	

TP Id	TP_IS_RLT_GEN_SEC_BV_02
Summary	Check that TLM service uses generic security profile to sign MAPEM message and does not include additional security header elements
Reference	ETSI TS 103 301 [1], clause 12
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT sending MAPEM ensure that when a SPATEM is generated then the IUT sends a valid MAPEM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_MAPEM** and containing generationTime indicating realistic generation time and optionally containing generationLocation and not containing other header items	

5.2.2.6.2 Check RLT SSP version

TP Id	TP_IS_RLT_GEN_SSP_BV_01
Summary	Check that RLT service uses certificate containing valid Service Specific Permissions of type BitmapSsp to sign MAPEM messages and the SSP version is set to 1
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign MAPEM with the certificate **CERT_MAP_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 ensure that when the IUT is requested to generate a MAPEM containing map not containing intersections and not containing roadSegments then the IUT sends a MAPEM signed with the **CERT_SPAT_SSP_NONE**	

5.2.2.6.3 Check RLT Service specific parameters

TP Id	TP_IS_RLT_GEN_SSP_BV_02
Summary	Check that RLT service sends a MAPEM message containing intersections when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign MAPEM with the certificate **CERT_MAP_SSP_1** containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 0 of octet 1 set to 1 and indicating other bits set to 0 ensure that when the IUT is requested to generate a MAPEM containing map containing intersections and not containing roadSegments then the IUT sends a MAPEM signed with the **CERT_SPAT_SSP_1**	

TP Id	TP_IS_RLT_GEN_SSP_BO_03
Summary	Check that RLT service does not send a MAPEM message containing intersections if it is not permitted by the certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign MAPEM with the certificate **CERT_MAP_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 ensure that when the IUT is requested to generate a MAPEM containing map containing intersections and not containing roadSegments then the IUT does not send a MAPEM	

TP Id	TP_IS_RLT_GEN_SSP_BV_04
Summary	Check that RLT service sends a MAPEM message containing roadSegments when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign MAPEM with the certificate **CERT_MAP_SSP_2** containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating bit at position 1 of octet 1 set to 1 and indicating other bits set to 0 ensure that when the IUT is requested to generate a MAPEM containing map containing roadSegments and not containing intersections then the IUT sends a MAPEM signed with the **CERT_SPAT_SSP_2**	

TP Id	TP_IS_RLT_GEN_SSP_BO_05
Summary	Check that RLT service does not send a MAPEM message containing roadSegments if it is not permitted by the certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "MAPEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign MAPEM with the certificate **CERT_MAP_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 ensure that when the IUT is requested to generate a MAPEM containing map containing roadSegments and not containing intersections then the IUT does not send a MAPEM	

5.2.2.7 Check the RLT message transmission rate requirements

TP Id	TP_IS_RLT_GEN_RATE_BV_01
Summary	Check that the IUT transmits MAPEM with valid transmission rate
Reference	CEN ISO/TS 19091 [3], clause 6.15
PICS Selection	PICS_MAPEM_GENERATION AND PICS_MAPEM_TRANSMISSION_RATE
Expected behaviour	
with the IUT being in the "MAPEM initial state" the IUT has sent MAPEM message at TIME_1 ensure that when IUT is triggered to send a next MAPEM then the IUT sends MAPEM at TIME_2 indicating DELTA = TIME_2 - TIME_1 where DELTA is less than 2 second and more then 500 ms	

5.2.2.8 Check the RLT message reception

TP Id	TP_IS_RLT_GEN_RCV_BV_03
Summary	Check that the IUT can successfully process all mandatory fields of MAPEM received
Reference	ETSI TS 103 301 [1], clause 6.3
PICS Selection	PICS_MAPEM_RECEPTION
Expected behaviour	
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	

TP Id	TP_IS_RLT_RCV_SEC_BV_01
Summary	Check that the IUT accepts the MAPEM signed with valid certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a MAPEM containing spat not containing intersections and not containing roadSegments and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 then the IUT accepts the received MAPEM	

TP Id	TP_IS_RLT_RCV_SEC_BO_02
Summary	Check that the IUT discards the MAPEM signed with certificate without permissions to sign MAPEM
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a MAPEM containing spat not containing intersections and not containing roadSegments and signed with the certificate not containing appPermission item containing psid indicating **ITS_AID_MAPEM** then the IUT discards the received MAPEM	

TP Id	TP_IS_RLT_RCV_SSP_BO_03
Summary	Check that the IUT discards the MAPEM containing intersections signed with certificate without service specific permissions (SSP) to sign such a MAPEM
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a MAPEM containing spat containing intersections and not containing roadSegments and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 then the IUT discards the received MAPEM	

TP Id	TP_IS_RLT_RCV_SSP_BO_04
Summary	Check that the IUT discards the MAPEM containing roadSegments signed with certificate without service specific permissions (SSP) to sign such a MAPEM
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_MAPEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a MAPEM containing spat containing roadSegments and not containing intersections and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_MAPEM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 then the IUT discards the received MAPEM	

5.2.3 Infrastructure to Vehicle Information (IVI) service

5.2.3.1 Check that IVIM protocol version is set to 1

TP Id	TP_IS_IVI_GEN_MSGF_BV_01
Summary	Check that protocolVersion is set to 1 and messageID is set to 6
Reference	ETSI TS 103 301 [1], clause 7.3
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
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'	

5.2.3.2 Check Location Container and location references

TP Id	TP_IS_IVI_GEN_LOC_BV_01
Summary	Check that all Application Containers references existing items in one or more Location Containers
Reference	CEN ISO/TS 19321 [4], clauses 5.1.1 and 6.2.2.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing any element of other types than GeographicLocationContainer containing any reference to zones (**Z_ID**) then the IUT sends a valid IVIM containing ivi containing optional containing elements of type GeographicLocationContainer containing parts containing elements of type GlcPart containing zoneId indicating **Z_ID**	

TP Id	TP_IS_IVI_GEN_LOC_BV_02
Summary	Check that application container information of the same type does not refer to overlapping RZs
Reference	CEN ISO/TS 19321 [4], clause 5.1.1
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending IVIM
ensure that
when
the IUT is requested to generate an IVIM
containing ivi
containing optional
containing an element of any other type (**T**) than GeographicLocationContainer
containing relevanceZoneIds
indicating reference to zone (**Z_ID_1**)
and containing another element of type **T**
containing relevanceZoneIds
indicating reference to zone (**Z_ID_2**)
then
the IUT sends an IVIM
containing ivi
containing optional
containing element of type GeographicLocationContainer
containing parts
containing elements of type GlcPart (**ZONE_1**)
containing zoneId
indicating **Z_ID_1**
and containing element of type GeographicLocationContainer
containing parts
containing elements of type GlcPart (**ZONE_2**)
containing zoneId
indicating **Z_ID_2**
and **ZONE_1** does not overlap **ZONE_2**

TP Id	TP_IS_IVI_GEN_LOC_BV_03
Summary	Check that all definitions of zones that are based on the same Reference Position, be it that they are connected or not interconnected, should be included in the same Geographic Location Container
Reference	CEN ISO/TS 19321 [4], clause 6.2.2.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	

with
the IUT being in the "initial state"
and the IUT sending IVIM
ensure that
when
the IUT is requested to generate an IVIM
containing ivi
containing optional
containing more then one element of type GeographicLocationContainer
then
the IUT sends an IVIM
containing ivi
containing optional
containing element of type GeographicLocationContainer
containing referencePosition
indicating **POSITION**
and not containing another element of type GeographicLocationContainer
containing referencePosition
indicating **POSITION**

TP Id	TP_IS_IVI_GEN_LOC_BV_04
Summary	Check that the IUT includes the component laneNumber for each zone if the zone definition is restricted to specific lane(s)
Reference	CEN ISO/TS 19321 [4], clause 6.2.2.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing zone definitions (**ZONE_1**) restricted to specific lane (**LANE_1**) then the IUT sends an IVIM containing ivi containing optional containing element of type GeographicLocationContainer containing parts containing elements of type GlcPart containing zone indicating **ZONE_1** and containing laneNumber indicating **LANE_1**	

TP Id	TP_IS_IVI_GEN_LOC_BV_05
Summary	Check that If the zone definition applies to the entire carriageway (all lanes), the component laneNumber shall be absent
Reference	CEN ISO/TS 19321 [4], clause 6.2.2.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing zone definitions (**ZONE_1**) applies to the entire carriageway then the IUT sends an IVIM containing ivi containing optional containing element of type GeographicLocationContainer containing parts containing elements of type GlcPart containing zone indicating **ZONE_1** and not containing laneNumber	

TP Id	TP_IS_IVI_GEN_LOC_BV_06
Summary	Check that IUT includes, for each zone, one or more of the following optional components to define the zone: the component zoneExtension and/or the component zoneHeading or, alternatively, the component zone
Reference	CEN ISO/TS 19321 [4], clause 6.2.2.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing zone definitions then the IUT sends an IVIM containing ivi containing optional containing any elements of type GeographicLocationContainer containing parts containing any elements of type GlcPart containing zoneExtension or containing zoneHeading or containing zone	

5.2.3.3 IVI Management Container

TP Id	TP_IS_IVI_GEN_MANC_BV_01
Summary	Check that management container contains a country code according to ISO/TS 3166-1 [i.6] Numbers shall be assigned on national basis
Reference	CEN ISO/TS 19321 [4], clause 6.1.1
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM then the IUT sends an IVIM containing ivi containing mandatory containing serviceProviderId containing countryCode indicating valid country code according to ISO 3166-1	

TP Id	TP_IS_IVI_GEN_MANC_BV_02
Summary	Check that an IUT can split an IVI Structure to multiple messages if it exceeds the maximum PDU size. Check that the IVIM contains the component connectedIviStructures to connect the IVI Structure to other IVI Structures provided by the same Service Provider that have been transmitted previously or by other ITS-S.
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_FRAGMENTATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM exceeding the maximum PDU size then the IUT sends the first IVIM (**IVI_1**) containing ivi containing mandatory containing iviIdentificationNumber (**IVI_1_ID)** and containing connectedIviStructures containing elements of type IviIdentificationNumber indicating ids of other IVI structures: **IVI_2_ID, …, IVI_N_ID** and the IUT sends subsequent IVIM containing ivi containing mandatory containing iviIdentificationNumber (**IVI_N)** and containing connectedIviStructures containing elements of type IviIdentificationNumber indicating ids of other IVI structures: **IVI_1_ID, …**	

5.2.3.4 Check IVIM status and identification number

5.2.3.4.1 Check that new iviIdentificationNumber value is generated for each new request

TP Id	TP_IS_IVI_GEN_EVGN_BV_01
Summary	Check that IVI Service generates a new IVIM on reception of a valid AppIVIM_Trigger request
Reference	ETSI TS 103 301 [1], clause 7.4.1
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" ensure that when the IUT receives an AppIVIM_Trigger request from the application layer then the IUT sends a valid IVIM	

TP Id	TP_IS_IVI_GEN_EVGN_BV_02
Summary	Check that a new iviIdentificationNumber value is assigned for each newly generated IVIM
Reference	ETSI TS 103 301 [1], clause 7.4.1
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated several IVIM ensure that when the IUT is requested to generate an IVIM containing new data then the IUT sends a valid IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating an unused value	

5.2.3.4.2 Check that the value of iviIdentificationNumber is not used recently

TP Id	TP_IS_IVI_GEN_EVGN_BV_03
Summary	Check that iviIdentificationNumber value is set to a next unused value each time an IVIM is detected
Reference	ETSI TS 103 301 [1], clause 7.4.1
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated several IVIM and the IUT having generated its last IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVI_ID_1 and no active IviID being associated with iviIdentificationNumber IVI_ID_1 + 1 ensure that when the IUT is requested to generate a new IVIM then the IUT sends a valid IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVI_ID_1 + 1	

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

TP Id	TP_IS_IVI_GEN_EVGN_BV_04
Summary	Check that a new generated IVIM contains an iviStatus set to 'new'
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
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'	

5.2.3.4.4 Check that an updated IVIM contains an iviStatus set to 'update'

TP Id	TP_IS_IVI_GEN_EVUP_BV_01
Summary	Check that an updated IVIM contains an iviStatus set to 'update'
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_UPDATE
Expected behaviour	
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' 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'	

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

TP Id	TP_IS_IVI_GEN_EVUP_BV_02
Summary	Check that an update can change the validity time to the IVIM - validTo information field
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_UPDATE
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated an event containing ivi containing mandatory not containing validTo and containing iviStatus indicating 'update' ensure that when the IUT receives an AppIVIM_update indicating a validTo value VT_1 then the IUT sends a valid IVIM containing ivi containing mandatory containing validTo indicating VT_1 and containing iviStatus indicating 'update'	

TP Id	TP_IS_IVI_GEN_EVUP_BV_03
Summary	Check that an update can change the validity time to the IVIM - validFrom information field
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_UPDATE
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated an event containing ivi containing mandatory containing validFrom indicating VT_1 containing iviStatus indicating 'update' ensure that when the IUT receives an AppIVIM_update indicating a validTo value VT_2 then the IUT sends a valid IVIM containing ivi containing mandatory containing validFrom indicating VT_2 containing iviStatus indicating 'update'	

5.2.3.4.7 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)

TP Id	TP_IS_IVI_GEN_EVGN_BV_05
Summary	Check that the timeStamp is set to the current time when generating a new IVM
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
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 timeStamp indicating CLT containing iviStatus indicating 'new'	

TP Id	TP_IS_IVI_GEN_EVUP_BV_04
Summary	Check that the timeStamp is set to the current time when generating an update with some change of information content
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_UPDATE
Expected behaviour	
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' ensure that when the IUT receives an AppIVIM_update then the IUT sends a valid IVIM containing ivi containing mandatory containing timeStamp indicating CLT containing iviStatus indicating 'update'	

5.2.3.4.8 Check that the iviIdentificationNumber remains unchanged when IVIM is updated

TP Id	TP_IS_IVI_GEN_EVUP_BV_05
Summary	Check that the iviIdentificationNumber remains unchanged IVIM is updated
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_UPDATE
Expected behaviour	
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' 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 iviIdentificationNumber indicating IVIM_ID_1 and containing iviStatus indicating 'update'	

5.2.3.5 IVI General Application Container

TP Id	TP_IS_IVI_GEN_GENAPP_BV_01
Summary	The IUT shall, at minimum, include the identifier(s) of a Relevance Zone in the component relevanceZoneIds or of an ITS Regulatory Region in the component its-Rrid.
Reference	CEN ISO/TS 19321 [4], clause 6.3.2.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_HAS_GENERAL_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing General Application Containers then the IUT sends a valid IVIM containing ivi containing optional containing elements of type GeneralIviContainer containing elements of type GicPart containing relevanceZoneIds or containing its-Rrid	

TP Id	TP_IS_IVI_GEN_GENAPP_BV_02
Summary	Check that all zone IDs in the General Application Container references existing items in the Location Container of the same IVIM Structure
Reference	CEN ISO/TS 19321 [4], clause 6.3.2.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_HAS_GENERAL_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing one or more General Application Containers containing elements of types GicPart optionally containing relevanceZoneIds containing ***RZ_IDs*** and optionally containing detectionZoneIds containing ***DZ_IDs*** and optionally containing driverAwarenessZoneIds containing ***DAZ_IDs*** then the IUT sends a valid IVIM containing ivi containing optional containing elements of types GeographicLocationContainer containing all zones referenced from ***RZ_IDs***, ***DZ_IDs*** and ***DAZ_IDs***	

TP Id	TP_IS_IVI_GEN_GENAPP_BV_03
Summary	The IUT shall include the component direction to describe the direction of relevance within a Relevance Zone representing a road segment.
Reference	CEN ISO/TS 19321 [4], clause 6.3.2.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_HAS_GENERAL_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing General Application Containers containing relevanceZoneIds then the IUT sends a valid IVIM containing ivi containing optional containing element of type GeneralIviContainer containing element of type GicPart containing relevanceZoneIds and containing direction	

TP Id	TP_IS_IVI_GEN_GENAPP_BV_04
Summary	The IUT shall include at least one element in the roadSignCodes container. The IUT shall include at least one element in the component roadSignCode to specify which road signs are applicable for a Relevance Zone. A sending ITS-S should select the road sign from a catalogue which is known to be supported by a receiving ITS-S.
Reference	CEN ISO/TS 19321 [4], clause 6.3.2.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_HAS_GENERAL_CONTAINER AND **PICS_X**

Expected behaviour

with
the IUT being in the "initial state"
and the IUT sending IVIM
ensure that
when
the IUT is requested to generate an IVIM
containing General Application Containers
then
the IUT sends a valid IVIM
containing ivi
containing optional
containing element of type GeneralIviContainer
containing element of type GicPart
containing roadSignCodes
containing at least 1 element of type RSCode
containing code
containing **COMPONENT_X**

Variants

PICS_X	**COMPONENT_X**
PICS_IVIM_RSCODE_VIENNACONV	viennaConvention
PICS_IVIM_RSCODE_ISO14823	ISO14823Code
PICS_IVIM_RSCODE_SAEJ2540	itisCodes
PICS_IVIM_RSCODE_ANY_CATALOGUE	anyCatalogue

TP Id	TP_IS_IVI_GEN_GENAPP_BV_05
Summary	Check that all layoutID of the General Application Containers references existing layouts in the Layout Containers of the same IVIM Structure
Reference	CEN ISO/TS 19321 [4], clause 6.3.4.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_HAS_GENERAL_CONTAINER AND PICS_IVIM_HAS_LAYOUT_CONTAINER

Expected behaviour

with
the IUT being in the "initial state"
and the IUT sending IVIM
ensure that
when
the IUT is generating an IVIM
containing ivi
containing optional
containing elements of type GeneralIviContainer
containing element of type GicPart
containing layoutId (***LID***)
then
the IUT sends an IVIM
containing ivi
containing optional
containing elements of type LayoutContainer
containing layoutId
indicating ***LID***

5.2.3.6 IVI Road Configuration Container

TP Id	TP_IS_IVI_GEN_RCC_BV_01
Summary	Check that all zone IDs in the Road Configuration Container references existing items in the Location Container of the same IVIM Structure
Reference	CEN ISO/TS 19321 [4], clause 6.3.3.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_HAS_ROAD_CFG_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing elements of types RoadConfigurationContainer containing elements of types RccPart containing relevanceZoneIds containing **RZ_IDs** then the IUT sends a valid IVIM containing ivi containing optional containing elements of types GeographicLocationContainer containing all zones referenced from ***RZ_IDs***	

TP Id	TP_IS_IVI_GEN_RCC_BV_02
Summary	Check that all Parts that relate to the same Location Container are included in the same Road Configuration Container
Reference	CEN ISO/TS 19321 [4], clause 6.3.3.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_HAS_ROAD_CFG_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing multiple RoadConfigurationContainer and containing multiple GeographicLocationContainer then the IUT sends a valid IVIM containing ivi containing optional containing elements of types RoadConfigurationContainer containing elements of types RccPart containing relevanceZoneIds referencing the GeographicLocationContainer (***GLC***) and not containing other elements of types RoadConfigurationContainer containing elements of types RccPart containing relevanceZoneIds referencing the same GeographicLocationContainer (***GLC***)	

TP Id	TP_IS_IVI_GEN_RCC_BV_03
Summary	Check that Road Configuration Container contains description of all present lanes
Reference	CEN ISO/TS 19321 [4], clause 6.3.3.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_HAS_ROAD_CFG_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM and the IUT has sent or received MAPEM containing description of the target road ensure that when the IUT is requested to generate an IVIM containing RoadConfigurationContainer containing description of the target road then the IUT sends a valid IVIM containing ivi containing optional containing element of types RoadConfigurationContainer containing element of types RccPart containing laneConfiguration containing elements of type LaneInformation describing all existing lanes of the target road	

5.2.3.7 IVI Text Container

TP Id	TP_IS_IVI_GEN_TEXT_BV_01
Summary	Check that all zone IDs in the Text Container references existing items in the Location Container of the same IVIM Structure
Reference	CEN ISO/TS 19321 [4], clause 6.3.4.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_HAS_TEXT_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing one or more TextContainer containing elements of types TcPart containing relevanceZoneIds containing ***RZ_IDs*** and optionally containing detectionZoneIds containing ***DZ_IDs*** and optionally containing driverAwarenessZoneIds containing ***DAZ_IDs*** then the IUT sends a valid IVIM containing ivi containing optional containing elements of types GeographicLocationContainer containing all zones referenced from ***RZ_IDs***, ***DZ_IDs*** and ***DAZ_IDs***	

TP Id	TP_IS_IVI_GEN_TEXT_BV_02
Summary	The sending ITS-S shall include the component direction to describe the direction of relevance within a Relevance Zone representing a road segment
Reference	CEN ISO/TS 19321 [4], clause 6.3.4.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_HAS_TEXT_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing Text Containers then the IUT sends a valid IVIM containing ivi containing optional containing elements of type TextContainer containing element of type TcPart containing direction	

TP Id	TP_IS_IVI_GEN_TEXT_BV_03
Summary	The IUT can include either the component text and/or the component data. The IUT can repeat the text in the component text in different languages with the appropriate unique language code
Reference	CEN ISO/TS 19321 [4], clause 6.3.4.2
PICS Selection	PICS_IVIM_GENERATION PICS_IVIM_HAS_TEXT_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM containing Text Containers then the IUT sends a valid IVIM containing ivi containing optional containing elements of type TextContainer containing element of type TcPart containing non-empty data and/or containing text containing elements of type Text containing language indicating unique language code	

TP Id	TP_IS_IVI_GEN_TEXT_BV_04
Summary	Check that all layoutID of the Text Containers references existing layouts in the Layout Containers of the same IVIM Structure
Reference	CEN ISO/TS 19321 [4], clause 6.3.4.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IVIM_HAS_TEXT_CONTAINER AND PICS_IVIM_HAS_LAYOUT_CONTAINER
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending IVIM ensure that when the IUT is generating an IVIM containing ivi containing optional containing elements of type TextContainer containing element of type TcPart containing layoutId (***LID***) then the IUT sends an IVIM containing ivi containing optional containing elements of type LayoutContainer containing layoutId indicating ***LID***	

5.2.3.8 IVI repetition

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

TP Id	TP_IS_IVI_GEN_GFQ_TI_01
Summary	Check that IVIMs are not generated more frequently than T_GenIvimMin
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_T_GENIVIMMIN AND PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated several IVIM ensure that when the IUT sends a IVIM then the IUT does not send any IVIM before expiry of T_GenIvimMin	

TP Id	TP_IS_IVI_GEN_GFQ_TI_02
Summary	Check that IVIMs are not generated less frequently than T_GenIvimMax
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_T_GENIVIMMAX AND PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated several IVIM ensure that when the IUT sends a IVIM then the IUT sends another IVIM before expiry of T_GenIvimMax	

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

TP Id	TP_IS_IVI_GEN_EVRP_BV_01
Summary	Check that the IUT activates repetition on reception of a valid AppIVIM_Update request
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_UPDATE
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated several IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 ensure that when the IUT receives an AppIVIM_Update indicating 'repetition interval' RI_1 then the IUT sends IVIM with respect to the 'repetition interval' RI_1 containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1	

TP Id	TP_IS_IVI_GEN_EVRP_BV_02
Summary	Check that the IUT deactivates repetition on reception of a valid AppIVIM_Update request
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_UPDATE
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated several IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 ensure that when the IUT receives an AppIVIM_Update indicating 'repetition interval' 0 then the IUT stops sending IVIM associated with IVIM_ID_1	

5.2.3.9 Check the IVI termination

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

TP Id	TP_IS_IVI_GEN_EVTR_BV_01
Summary	Check that the IUT terminates IVM generation on validity duration expiry
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated an IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 and containing validTo indicating CLT + 10 seconds and containing iviStatus indicating 'new' ensure that when the IUT is alerted of expiration of the time associated with validTo then the IUT stops ending IVIM associated with IVIM_ID_1	

TP Id	TP_IS_IVI_GEN_EVTR_BV_02
Summary	Check that the IUT terminates IVM generation on termination request
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated an IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 and containing iviStatus indicating 'new' ensure that when the IUT receives an AppIVIM_termination request associated with IVIM_ID_1 then the IUT sends a valid IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 containing iviStatus indicating 'termination'	

5.2.3.9.2 Check that the IVI Service terminates IVM generation on cancellation request

TP Id	TP_IS_IVI_GEN_EVTR_BV_03
Summary	Check that the IUT terminates IVM generation on cancellation request
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVI_CANCELLATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having generated an IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 and containing serviceProviderId indicating IVIM_SP_1 and containing iviStatus indicating 'new' ensure that when the IUT receives an AppIVIM_cancellation request associated with IVIM_ID_1 then the IUT sends a valid IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 and containing timeStamp indication IVM_CLT_1 and containing iviStatus indicating 'cancellation'	

5.2.3.9.3 Check that the IVI Service terminates IVM generation on negation request

TP Id	TP_IS_IVI_GEN_EVTR_BV_04
Summary	Check that the IUT terminates IVM generation on negation request
Reference	ETSI TS 103 301 [1], clause 7.4.2
PICS Selection	PICS_IVI_NEGATION
Expected behaviour	
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 and containing serviceProviderId indicating IVIM_SP_1 and containing iviStatus indicating 'update' ensure that when the IUT receives an AppIVIM_termination request associated with IVIM_ID_1 then the IUT sends a valid IVIM containing ivi containing mandatory containing iviIdentificationNumber indicating IVIM_ID_1 and containing serviceProviderId indicating IVIM_SP_1 and containing iviStatus indicating 'negation'	

5.2.3.10 Check BTP type and port number

TP Id	TP_IS_IVI_GEN_COM_BV_01
Summary	Check that IVIM uses BTP_B packet Check that the destination port for IVIM is set to 2006
Reference	ETSI TS 103 301 [1], clauses 10.2 and 7.4.3.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
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'	

5.2.3.11 Check destination type

TP Id	TP_IS_IVI_GEN_COM_BV_02
Summary	Check that IVI service encapsulates IVIM in a UNC with the HeaderType field set to the value of 2
Reference	ETSI TS 103 301 [1], clause 7.4.3.2
PICS Selection	PICS_IVIM_GENERATION
Expected behaviour	
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'	

5.2.3.12 IVI security parameters

5.2.3.12.1 Check IVI ITS AID value

TP Id	TP_IS_IVI_GEN_SEC_BV_01
Summary	Check that IVI service uses certificate containing valid ITS AID to sign IVIM
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT sending IVIM ensure that when the IUT is requested to generate an IVIM then the IUT sends an IVIM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_IVIM**	

TP Id	TP_IS_IVI_GEN_SEC_BV_02
Summary	Check that IVI service uses generic security profile to sign IVIM and does not include additional security header elements
Reference	ETSI TS 103 301 [1], clause 12
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT sending IVIM ensure that when a IVIM is generated then the IUT sends a valid IVIM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_IVIM** and containing generationTime indicating realistic generation time and optionally containing generationLocation and not containing other header items	

5.2.3.12.2 Check IVI SSP version

TP Id	TP_IS_IVI_GEN_SSP_BV_01
Summary	Check that IVI service uses certificate containing valid Service Specific Permissions of type BitmapSsp to sign IVIM from the given service provider and the SSP version is set to 1
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_IVIM** containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating octets at positions 1-3 set to **IVI_SP_VALUE** and indicating other bits set to 0 ensure that when the IUT is requested to generate an IVIM containing ivi containing mandatory containing serviceProviderId indicating **IVI_SP_VALUE** and containing iviStatus indicating **'new'** and not containing optional then the IUT sends an IVIM signed with the **CERT_IVI_SSP_NONE**	

TP Id	TP_IS_IVI_GEN_SSP_BO_01
Summary	Check that IVI service does not send an IVIM if service provider value is not authorized by the signing certificate
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating octets at positions 1-3 set to **IVI_SP_VALUE** ensure that when the IUT is requested to generate an IVIM containing ivi containing mandatory containing serviceProviderId indicating other value than **IVI_SP_VALUE** then the IUT does not send an IVIM signed with the **CERT_IVI_SSP_NONE**	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.	

5.2.3.12.3 Check IVI Service specific parameters

TP Id	TP_IS_IVI_GEN_SSP_BV_02
Summary	Check that IVI service sends an IVIM containing different road signs schema when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND **PICS_X**

Expected behaviour

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_X**
containing appPermission item
containing psid
indicating **ITS_AID_IVIM**
and containing bitmapSSP
indicating bit **BIT_X** of octet **OCTET_X** set to 1
ensure that
when
the IUT is requested to generate an IVIM
containing ivi
containing optional
containing element of type GeneralIviContainer
containing element of type GicPart
containing roadSignCodes
containing elements of type RSCode
containing code
containing **COMPONENT_X**
then
the IUT sends an IVIM
signed with the **CERT_IVI_SSP_X**

Variants

PICS_X	COMPONENT_X	OCTET_X	BIT_X	CERT_IVI_SSP_X
PICS_IVIM_RSCODE_VIENNACONV	viennaConvention	4	0	CERT_IVI_SSP_VIENNACONV
PICS_IVIM_RSCODE_SAEJ2540	itisCodes	4	7	CERT_IVI_SSP_SAEJ2540

NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.

TP Id	TP_IS_IVI_GEN_SSP_BV_03
Summary	Check that IVI service sends an IVIM containing ISO/TS 14823 [i.7] road signs codes of different service categories when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND PICS_IVIM_RSCODE_ISO14823

Expected behaviour

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_X**
containing appPermission item
containing psid
indicating **ITS_AID_IVIM**
and containing bitmapSSP
indicating bit **BIT_X** of octet **OCTET_X** set to 1
ensure that
when
the IUT is requested to generate an IVIM
containing ivi
containing optional
containing element of type GeneralIviContainer
containing element of type GicPart
containing roadSignCodes
containing elements of type RSCode
containing code
containing iso14823.pictogramCode.serviceCategoryCode
containing **COMPONENT_X**
then
the IUT sends an IVIM
signed with the **CERT_IVI_SSP_X**

Variants

COMPONENT_X	OCTET_X	BIT_X	CERT_IVI_SSP_X
trafficSignPictogram.dangerWarning	4	1	CERT_IVI_SSP_ISO14823_1
trafficSignPictogram.regulatory	4	2	CERT_IVI_SSP_ISO14823_2
trafficSignPictogram.informative	4	3	CERT_IVI_SSP_ISO14823_3
publicFacilitiesPictogram	4	4	CERT_IVI_SSP_ISO14823_4
ambientOrRoadContitionPictogram.ambientCondition	4	5	CERT_IVI_SSP_ISO14823_5
ambientOrRoadContitionPictogram.roadCondition	4	6	CERT_IVI_SSP_ISO14823_6

NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.

TP Id	TP_IS_IVI_GEN_SSP_BV_04
Summary	Check that IVI service sends an IVIM containing lane status when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND PICS_IVIM_RSCODE_ISO14823
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_LS** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating bit **0** of octet **5** set to 1 ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing element of type GeneralIviContainer containing element of type GicPart containing laneStatus then the IUT sends an IVIM signed with the **CERT_IVI_SSP_LS**	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.	

TP Id	TP_IS_IVI_GEN_SSP_BV_05
Summary	Check that IVI service sends an IVIM containing different containers when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND **PICS_X**
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_X** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating bit **BIT_X** of octet **OCTET_X** set to 1 ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing element of type **CONTAINER_X** then the IUT sends an IVIM signed with the **CERT_IVI_SSP_X**	

Variants

PICS_X	**CONTAINER_X**	**OCT_X**	**BIT_X**	**CERT_IVI_SSP_X**
PICS_IVIM_HAS_ROAD_CFG_CONTAINER	RoadConfigurationContainer	5	1	CERT_IVI_SSP_RCC
PICS_IVIM_HAS_TEXT_CONTAINER	TextContainer	5	2	CERT_IVI_SSP_TC
PICS_IVIM_HAS_LAYOUT_CONTAINER	LayoutContainer			CERT_IVI_SSP_LC

NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.

TP Id	TP_IS_IVI_GEN_SSP_BV_06
Summary	Check that IVI service sends an IVI negation when it is permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NEG** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating bit **4** of octet **5** set to 1 ensure that when the IUT is requested to generate an IVIM containing ivi containing mandatory containing iviStatus indnicating 'negation' then the IUT sends an IVIM signed with the **CERT_IVI_SSP_NEG**	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.	

TP Id	TP_IS_IVI_GEN_SSP_BO_02
Summary	Check that IVI service does not send an IVIM containing different road signs schema when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND **PICS_X**
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating bit **BIT_X** of octet **OCTET_X** set to 0 ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing element of type GeneralIviContainer containing element of type GicPart containing roadSignCodes containing elements of type RSCode containing code containing **COMPONENT_X** then the IUT does not send an IVIM signed with the **CERT_IVI_SSP_NONE**	

Variants			
PICS_X	**COMPONENT_X**	**OCTET_X**	**BIT_X**
PICS_IVIM_RSCODE_VIENNACONV	viennaConvention	4	0
PICS_IVIM_RSCODE_SAEJ2540	itisCodes	4	7
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.			

TP Id	TP_IS_IVI_GEN_SSP_BO_03
Summary	Check that IVI service does not send an IVIM containing ISO/TS 14823 [i.7] road signs codes of different service categories when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND PICS_IVIM_RSCODE_ISO14823

Expected behaviour

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE**
containing appPermission item
containing psid
indicating **ITS_AID_IVIM**
and containing bitmapSSP
indicating bit **BIT_X** of octet **OCTET_X** set to 0
ensure that
when
the IUT is requested to generate an IVIM
containing ivi
containing optional
containing element of type GeneralIviContainer
containing element of type GicPart
containing roadSignCodes
containing elements of type RSCode
containing code
containing iso14823.pictogramCode.serviceCategoryCode
and containing **COMPONENT_X**
then
the IUT sends a IVIM
signed with the **CERT_IVI_SSP_NONE**

Variants

COMPONENT_X	**OCTET_X**	**BIT_X**
trafficSignPictogram.dangerWarning	4	1
trafficSignPictogram.regulatory	4	2
trafficSignPictogram.informative	4	3
publicFacilitiesPictogram	4	4
ambientOrRoadContitionPictogram.ambientCondition	4	5
ambientOrRoadContitionPictogram.roadCondition	4	6

NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.

TP Id	TP_IS_IVI_GEN_SSP_BO_04
Summary	Check that IVI service does not send an IVIM containing lane status when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND PICS_IVIM_RSCODE_ISO14823
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating bit **0** of octet **5** set to 0 ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing element of type GeneralIviContainer containing element of type GicPart containing laneStatus then the IUT does not sends an IVIM signed with the **CERT_IVI_SSP_NONE**	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.	

TP Id	TP_IS_IVI_GEN_SSP_BO_05
Summary	Check that IVI service does not send an IVIM containing different containers when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED AND **PICS_X**
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_IVIM** containing bitmapSSP indicating bit **BIT_X** of octet **OCTET_X** set to 0 ensure that when the IUT is requested to generate an IVIM containing ivi containing optional containing element of type **CONTAINER_X** then the IUT does not send an IVIM signed with the **CERT_IVI_SSP_NONE**	

Variants			
PICS_X	**CONTAINER_X**	**OCT_X**	**BIT_X**
PICS_IVIM_HAS_ROAD_CFG_CONTAINER	RoadConfigurationContainer	5	1
PICS_IVIM_HAS_TEXT_CONTAINER	TextContainer	5	2
PICS_IVIM_HAS_LAYOUT_CONTAINER	LayoutContainer		
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.			

TP Id	TP_IS_IVI_GEN_SSP_BO_06
Summary	Check that IVI service does not send an IVI negation when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is authorized to sign IVIM with the certificate **CERT_IVI_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating bit **4** of octet **5** set to 0 ensure that when the IUT is requested to generate an IVIM containing ivi containing mandatory containing iviStatus indnicating 'negation' then the IUT does not send an IVIM signed with the **CERT_IVI_SSP_NONE**	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_GEN_SSP_BV_01.	

5.2.3.13 Check IVI reception

5.2.3.13.1 Check IVI reception – Basic tests

TP Id	TP_IS_IVI_RCV_MSGF_BV_01
Summary	Check that the IUT can successfully process IVIM been received when the IUT was in the Relevance Zone
Reference	ETSI TS 103 301 [1], clause 7.3
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" the IUT position is in the **R_ZONE** the IUT is approaching the relevance zone ensure that when the IUT receives a valid IVIM containing ivi containing optional containing an element of type GeneralIviContainer containing elements of types GicPart containing relevanceZoneIds containing ***RZ_ID*** and containing an element of type GeographicLocationContainer containing parts containing elements of types GlcPart containing zoneId indicating ***RZ_ID*** and containing zone indicating **R_ZONE** then the IUT forwards the IVIM content to upper layers and the IUT forwards the IVIM content to other facilities	

TP Id	TP_IS_IVI_RCV_DATA_BV_01
Summary	Check that the IUT can successfully process IVIM been received when the IUT was in the Detection Zone approaching the Relevance Zone
Reference	CEN ISO/TS 19321 [4], clause 5.1.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	

with
the IUT being in the "initial state"
the IUT position is in the **D_ZONE**
the IUT is approaching the relevance zone
ensure that
when
the IUT receives a valid IVIM
containing ivi
containing optional
containing an element of type GeneralIviContainer
containing elements of types GicPart
containing detectionZoneIds
containing ***DZ_ID***
and containing relevanceZoneIds
containing ***RZ_ID***
and containing direction
indicating direction to the **R_ZONE**
and containing an element of type GeographicLocationContainer
containing parts
containing elements of types GlcPart
containing zoneId
indicating ***DZ_ID***
and containing zone
indicating **D_ZONE**
and containing elements of types GlcPart
containing zoneId
indicating ***RZ_ID***
and containing zone
indicating **R_ZONE**
then
the IUT forwards the IVIM content to upper layers
and the IUT forwards the IVIM content to other facilities

TP Id	TP_IS_IVI_RCV_DATA_BV_02
Summary	Check that an IUT detects the applicability of a Relevance Zone defined as a polygonal lie
Reference	CEN ISO/TS 19321 [4], clause 5.2.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	

with
the IUT being in the "initial state"
the IUT position is in the **R_ZONE**
the IUT is approaching the relevance zone
ensure that
when
the IUT receives a valid IVIM
containing ivi
containing optional
containing an element of type GeneralIviContainer
containing elements of types GicPart
containing relevanceZoneIds
containing ***RZ_ID***
and containing an element of type GeographicLocationContainer
containing parts
containing elements of types GlcPart
containing zoneId
indicating ***RZ_ID***
and containing zone
containing segment
indicating **R_ZONE**
then
the IUT forwards the IVIM content to upper layers
and the IUT forwards the IVIM content to other facilities

TP Id	TP_IS_IVI_RCV_DATA_BV_03
Summary	Check that an IUT detects the applicability of a Relevance Zone defined as an area
Reference	CEN ISO/TS 19321 [4], clause 5.2.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	

with
the IUT being in the "initial state"
the IUT position is in the **R_ZONE**
the IUT is approaching the relevance zone
ensure that
when
the IUT receives a valid IVIM
containing ivi
containing optional
containing an element of type GeneralIviContainer
containing elements of types GicPart
containing relevanceZoneIds
containing ***RZ_ID***
and containing an element of type GeographicLocationContainer
containing parts
containing elements of types GlcPart
containing zoneId
indicating ***RZ_ID***
and containing zone
containing area
indicating **R_ZONE**
then
the IUT forwards the IVIM content to upper layers
and the IUT forwards the IVIM content to other facilities

TP Id	TP_IS_IVI_RCV_DATA_BV_04
Summary	Check that an IUT detects the applicability of a Relevance Zone defined as a distance value
Reference	CEN ISO/TS 19321 [4], clause 5.2.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" the IUT position is in the **R_ZONE** the IUT is approaching the relevance zone ensure that when the IUT receives a valid IVIM containing ivi containing optional containing an element of type GeneralIviContainer containing elements of types GicPart containing relevanceZoneIds containing ***RZ_ID*** and containing an element of type GeographicLocationContainer containing parts containing elements of types GlcPart containing zoneId indicating ***RZ_ID*** and containing zoneExtension indicating distance and indicating **R_ZONE** then the IUT forwards the IVIM content to upper layers and the IUT forwards the IVIM content to other facilities	

TP Id	TP_IS_IVI_RCV_DATA_BV_05
Summary	Check that an IUT detects the applicability of a Relevance Zone by matching its path with the relevance zone (path) of the moving IVI object.
Reference	CEN ISO/TS 19321 [4], clause 5.2.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" the IUT position is in the **R_ZONE** the IUT is approaching the relevance zone ensure that when the IUT receives a valid IVIM containing ivi containing optional containing an element of type GeneralIviContainer containing elements of types GicPart containing relevanceZoneIds containing ***RZ_ID*** and containing an element of type GeographicLocationContainer containing parts containing elements of types GlcPart containing zoneId indicating ***RZ_ID*** and containing zoneExtension indicating distance and indicating **R_ZONE** then the IUT forwards the IVIM content to upper layers and the IUT forwards the IVIM content to other facilities	

5.2.3.13.2 Check IVI reception – Status

TP Id	TP_IS_IVI_RCV_EVUP_BV_01
Summary	Check that a received IVIM is considered as new if iviStatus is "new"
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" the IUT is in the relevance zone the IUT has already received IVIM ensure that when the IUT receives a valid IVIM containing ivi containing mandatory containing iviStatus indicating 'new' then the IUT forwards the IVIM content to upper layers and the IUT considers the IVIM as new	

TP Id	TP_IS_IVI_RCV_EVUP_BV_02
Summary	Check that a received IVIM is considered as new if iviStatus is "new" and/or if the combination of serviceProviderId and iviIdentificationNumber is different from other received messages
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" the IUT is in the the relevance zone the IUT has **never** received IVIM containing ivi containing mandatory containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** ensure that when the IUT receives a valid IVIM containing ivi containing mandatory containing iviStatus indicating 'update' and containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** then the IUT forwards the IVIM content to upper layers and the IUT considers the IVIM as new	

TP Id	TP_IS_IVI_RCV_EVUP_BV_03
Summary	Check that a received IVIM is considered as update if the iviStatus is "update" and/or if the combination of serviceProviderId and iviIdentificationNumber equals to those from another received structure and the timestamp is more recent
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IVIM_UPDATE
Expected behaviour	

with
the IUT being in the "initial state"
the IUT is in the relevance zone
the IUT has already received IVIM
containing ivi
containing mandatory
containing serviceProviderId
indicating **SP_ID**
and containing iviIdentificationNumber
indicating **IVI_ID**
and containing timeStamp
indicating **TIME_1**
ensure that
when
the IUT receives a valid IVIM
containing ivi
containing mandatory
containing iviStatus
indicating 'update'
and containing serviceProviderId
indicating **SP_ID**
and containing iviIdentificationNumber
indicating **IVI_ID**
and containing timeStamp
indicating **TIME_2 > TIME_1**
then
the IUT forwards the IVIM content to upper layers
and the IUT considers the IVIM as update

TP Id	TP_IS_IVI_RCV_EVUP_BV_04
Summary	Check that a received IVIM is considered as duplicate of a received structure if the combination of serviceProviderId and iviIdentificationNumber equals to those from another received structure and the timestamp is the same
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IVIM_UPDATE
Expected behaviour	
with the IUT being in the "initial state" the IUT is in the relevance zone the IUT has already received IVIM containing ivi containing mandatory containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** and containing timeStamp indicating **TIME_1** ensure that when the IUT receives a valid IVIM containing ivi containing mandatory and containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** and containing timeStamp indicating **TIME_1** then the IUT considers the IVIM as duplicate	

TP Id	TP_IS_IVI_RCV_EVUP_BV_05
Summary	Check that a received IVIM is considered as cancelation if the iviStatus is "cancellation"
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IVIM_CANELATION
Expected behaviour	
with the IUT being in the "initial state" the IUT is in the relevance zone the IUT has already received IVIM containing ivi containing mandatory containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** ensure that when the IUT receives a valid IVIM containing ivi containing mandatory containing iviStatus indicating 'cancelation' and containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** then the IUT considers the IVIM as cancelation	

TP Id	TP_IS_IVI_RCV_EVUP_BV_06
Summary	Check that a received IVIM is considered as negation if the iviStatus is "negation"
Reference	CEN ISO/TS 19321 [4], clause 6.1.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IVIM_NEGATION
Expected behaviour	
with the IUT being in the "initial state" the IUT is in the relevance zone the IUT has already received IVIM containing ivi containing mandatory containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** ensure that when the IUT receives a valid IVIM containing ivi containing mandatory containing iviStatus indicating 'negation' and containing serviceProviderId indicating **SP_ID** and containing iviIdentificationNumber indicating **IVI_ID** then the IUT considers the IVIM as negation	

5.2.3.13.3 Check IVI reception – Security parameters

TP Id	TP_IS_IVI_RCV_SSP_BV_01
Summary	Check that the IUT accepts a received IVIM message permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives an IVIM containing ivi containing mandatory containing serviceProviderId indicating **IVI_SP_VALUE** and containing iviStatus indicating'new' and not containing optional and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating octet 1-3 representing **IVI_SP_VALUE** and indicating other bits set to 0 then the IUT accepts the received IVIM	

TP Id	TP_IS_IVI_RCV_SSP_BO_01
Summary	Check that the IUT discards a received IVIM message not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives an IVIM containing ivi containing mandatory containing serviceProviderId indicating **IVI_SP_VALUE** and containing iviStatus indicating'new' and not containing optional and signed with the certificate not containing appPermission item containing psid indicating **ITS_AID_IVIM** then the IUT discards the received IVIM	

TP Id	TP_IS_IVI_RCV_SSP_BO_02
Summary	Check that the IUT discards a received IVIM message with service provider identifier not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 5.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives an IVIM containing ivi containing mandatory containing serviceProviderId indicating **IVI_SP_VALUE** and containing iviStatus indicating'new' and not containing optional and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_IVIM** and containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating octet 1-3 **not** representing **IVI_SP_VALUE** and indicating other bits set to 0 then the IUT discards the received IVIM	

TP Id	TP_IS_IVI_RCV_SSP_BO_03
Summary	Check that IVI service skips a received IVIM containing different road signs schema when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED AND **PICS_X**

Expected behaviour

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
ensure that
when
the IUT receives an IVIM
containing ivi
containing optional
containing element of type GeneralIviContainer
containing element of type GicPart
containing roadSignCodes
containing elements of type RSCode
containing code
containing **COMPONENT_X**
and signed with the certificate
containing psid
indicating **ITS_AID_IVIM**
and containing appPermission item
containing bitmapSSP
indicating bit **BIT_X** of octet **OCTET_X** set to 0
then
the IUT discards the received IVIM then

Variants

PICS_X	COMPONENT_X	OCTET_X	BIT_X
PICS_IVIM_RSCODE_VIENNACONV	viennaConvention	4	0
PICS_IVIM_RSCODE_SAEJ2540	itisCodes	4	7

NOTE: Other SSP bits of signing certificate, not defined explicitly in the TP, shall be set accordingly to the TP_IS_IVI_RCV_SSP_BV_01.

TP Id	TP_IS_IVI_RCV_SSP_BO_04
Summary	Check that IVI service skips a received IVIM containing ISO/TS 14823 [i.7] road signs codes of different service categories when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED AND PICS_IVIM_RSCODE_ISO14823

Expected behaviour

with
the IUT being in the "initial state"
and the IUT is operating in secured mode
ensure that
when
the IUT receives an IVIM
containing ivi
containing optional
containing element of type GeneralIviContainer
containing element of type GicPart
containing roadSignCodes
containing elements of type RSCode
containing code
containing iso14823.pictogramCode.serviceCategoryCode
containing **COMPONENT_X**
and signed with the certificate
containing psid
indicating **ITS_AID_IVIM**
and containing appPermission item
containing bitmapSSP
and indicating bit **BIT_X** of octet **OCTET_X** set to 0
then
the IUT discards the received IVIM

Variants

COMPONENT_X	OCTET_X	BIT_X
trafficSignPictogram.dangerWarning	4	1
trafficSignPictogram.regulatory	4	2
trafficSignPictogram.informative	4	3
publicFacilitiesPictogram	4	4
ambientOrRoadContitionPictogram.ambientCondition	4	5
ambientOrRoadContitionPictogram.roadCondition	4	6

NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_RCV_SSP_BV_01.

TP Id	TP_IS_IVI_RCV_SSP_BO_05
Summary	Check that IVI service skips a received IVIM containing lane status when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED AND PICS_IVIM_RSCODE_ISO14823
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives an IVIM containing ivi containing optional containing element of type GeneralIviContainer containing element of type GicPart containing laneStatus and signed with the certificate containing psid indicating **ITS_AID_IVIM** and containing appPermission item containing bitmapSSP indicating bit **0** of octet **5** set to 0 then the IUT discards received IVIM	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_RCV_SSP_BV_01.	

TP Id	TP_IS_IVI_RCV_SSP_BO_06
Summary	Check that IVI service skips a received IVIM containing different containers when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED AND **PICS_X**
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives an IVIM containing ivi containing optional containing element of type **CONTAINER_X** and signed with the certificate containing psid indicating **ITS_AID_IVIM** and containing appPermission item containing bitmapSSP indicating bit **BIT_X** of octet **OCTET_X** set to 0 then the IUT discards the received IVIM	

Variants			
PICS_X	**CONTAINER_X**	**OCT_X**	**BIT_X**
PICS_IVIM_HAS_ROAD_CFG_CONTAINER	RoadConfigurationContainer	5	1
PICS_IVIM_HAS_TEXT_CONTAINER	TextContainer	5	2
PICS_IVIM_HAS_LAYOUT_CONTAINER	LayoutContainer	5	3
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_RCV_SSP_BV_01.			

TP Id	TP_IS_IVI_RCV_SSP_BO_07
Summary	Check that IVI service skips a received IVI negation when it is not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 6.4.3.2
PICS Selection	PICS_IVIM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives an IVIM containing ivi containing mandatory containing iviStatus indnicating 'negation' and signed with the certificate containing psid indicating **ITS_AID_IVIM** and containing appPermission item containing bitmapSSP indicating bit **4** of octet **5** set to 0 then the IUT discards the received IVIM	
NOTE: Other SSP bits not defined explicitly in the TP shall be set accordingly to the TP_IS_IVI_RCV_SSP_BV_01.	

5.2.4 Traffic Light Control (TLC) service

5.2.4.1 Check the SREM generation behaviour

5.2.4.1.1 Initial conditions

According to CEN ISO/TS 19091 [3], clauses 6.4.1 and 6.2.1, the IUT shall conform to the following initial conditions:

```
the IUT has received MAPEM
    containing the information about the target intersection (TI)
        containing the approach information (AI)
the IUT has received SREM
    containing the information about signal phases on the target intersection TI
the IUT is approaching the intersection by the approaching information AI
the IUT is authorized to send SREM
```

These conditions constitute the "SREM initial state".

5.2.4.1.2 Check the SREM generation

TP Id	TP_IS_TLCR_GEN_EVGN_BV_01
Summary	Check that TLC Service generates a SREM on reception of a valid AppSREM_Trigger request (ITS-S)
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clause 6.4
PICS Selection	PICS_SREM_GENERATION
Expected behaviour	
with the IUT being in the "SREM initial state" ensure that when the IUT receives an AppSREM_Trigger request from the application layer then the IUT sends a valid SREM containing srm containing requests containing an item of type SignalRequestPackage containing request containing id indicating the target intersection ***TI*** and containing inBoundLane indicating the approach information ***AI***	

5.2.4.1.3 Check the SREM format

5.2.4.1.3.1 Check the SREM PDU header

TP Id	TP_IS_TLCR_GEN_MSGF_BV_01
Summary	Check that protocolVersion is set to 1 and messageID is set to 9 (ITS-S)
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_GENERATION
Expected behaviour	
with the IUT being in the "SREM initial state" ensure that when the IUT is requested to generate a SREM then the IUT sends a message containing ITS PDU header containing protocolVersion indicating value '1' and containing messageID indicating value '9'	

5.2.4.1.3.2 Check the SREM conformance

TP Id	TP_IS_TLCR_GEN_EVGN_BV_02
Summary	Check that the IUT generates SREM containing requestor information
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clauses 6.2.7, 6.2.9, 6.2.10, 6.4.6, 6.4.8 and 6.4.9
PICS Selection	PICS_SREM_GENERATION
Expected behaviour	
with the IUT being in the "SREM initial state" ensure that when the IUT is requested to generate a SREM then the IUT sends a SREM containing srm containing requestor containing type containing role indicating the IUT role containing position containing position indicating the current IUT position	

TP Id	TP_IS_TLCR_GEN_EVGN_BV_03
Summary	Check that the IUT generates SREM containing public transport information
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clauses 6.4.10 and 6.4.15
PICS Selection	PICS_SREM_GENERATION AND PICS_PUBLIC_TRANSPORT
Expected behaviour	
with the IUT being in the "SREM initial state" ensure that when the IUT is requested to generate a SREM then the IUT sends a SREM containing srm containing requestor containing type containing role indicating '*publicTransport*' and containing transitStatus indicating the PTV status and containing transitOccupancy indicating the PTV loading level and containing transitSchedule indicating the difference in minutes between the scheduled and current location of the PTV	

TP Id	TP_IS_TLCR_GEN_EVGN_BV_04
Summary	Check that the IUT generates SREM containing timing information
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clauses 6.2.8, 6.2.13, 6.4.7 and 14
PICS Selection	PICS_SREM_GENERATION AND PICS_SREM_HAS_TIMING
Expected behaviour	
with the IUT being in the "SREM initial state" ensure that when the IUT is requested to generate a SREM then the IUT sends a SREM containing srm containing requests containing an item of type SignalRequestPackage containing minute and second indicating the estimated duration between the current time and the moment when IUT arrives to the intersection stopping point (TIME_1) and containing duration indicating the duration as seconds when the request remains active after the TIME_1	

5.2.4.1.4 Check that the IUT identifies SREM with a unique request identifier

TP Id	TP_IS_TLCR_GEN_EVGN_BV_05
Summary	Check that the IUT identifies SREM with a unique request identifier (ITS-S)
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clause 6.4.2
PICS Selection	PICS_SREM_GENERATION
Expected behaviour	
with the IUT being in the "SREM 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 containing an item of type SignalRequestPackage containing request containing id indicating the target intersection ***TI*** containing requestID indicating an unused value	

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

TP Id	TP_IS_TLCR_GEN_EVUP_BV_01
Summary	Check that the IUT increments the sequenceNumber when a SREM update is generated
Reference	ETSI TS 103 301 [1], clause 8.4.1
PICS Selection	PICS_SREM_GENERATION
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT having generate a SREM containing srm containing sequenceNumber indicating SREM_SN_1 containing requests containing an item of type SignalRequestPackage containing request containing requestID indicating SREM_RID_1 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 containing requests containing an item of type SignalRequestPackage containing request containing requestID indicating SREM_RID_1	

5.2.4.1.6 Check BTP type and port number

TP Id	TP_IS_TLCR_GEN_COM_BV_01
Summary	Check that SREM uses BTP_B packet Check that the destination port for IVIM is set to 2007
Reference	ETSI TS 103 301 [1], clauses 10.2 and 8.4.3.3
PICS Selection	PICS_SREM_GENERATION
Expected behaviour	
with the IUT being in the "SREM 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 BTP-B packet containing a destination port value set to '2007' and containing a destination port info value set to '0'	

5.2.4.1.7 Check destination type

TP Id	TP_IS_TLCR_GEN_COM_BV_02
Summary	Check that TLM service encapsulates SREM in a GBC with the HeaderType field set to the value of 4
Reference	ETSI TS 103 301 [1], clause 8.4.3.3
PICS Selection	PICS_SREM_GENERATION AND PICS_SHORT_RANGE
Expected behaviour	
with the IUT being in the "SREM 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'	

5.2.4.1.8 Check the SREM cancelation

TP Id	TP_IS_TLCR_GEN_CANC_BV_01
Summary	Check that the IUT generates SREM cancelation
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clauses 6.2.11 and 6.4.11
PICS Selection	PICS_SREM_GENERATION AND PICS_SREM_CANCELATION
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is recently having sent SREM containing srm containing requestor containing id indicating the vehicle ID (***VID***) and containing requests containing an item of type SignalRequestPackage containing request containing id indicating the target intersection ***TI*** and containing requestID indicating value (***ReqID***) ensure that when the IUT receives an *AppSREM_Cancel* request from the application layer then the IUT sends a SREM containing srm containing requestor containing id indicating the vehicle ID (***VID***) and containing requests containing an item of type SignalRequestPackage containing request containing id indicating the target intersection ***TI*** and containing requestID indicating value (***ReqID***) and containing requestType indicating 'priorityCancellation'	

5.2.4.1.9 Check the SREM security parameters

5.2.4.1.9.1 Check the SREM ITS AID value

TP Id	TP_IS_TLCR_GEN_SEC_BV_01
Summary	Check that TLC service uses certificate containing valid ITS AID to sign SREM messages
Reference	ETSI TS 103 301 [1], clause 8.4.3.2
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is operating in secured mode ensure that when the IUT is requested to generate a SREM then the IUT sends a SREM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_SREM**	

TP Id	TP_IS_TLCR_GEN_SEC_BV_02
Summary	Check that TLC service uses generic security profile to sign SREM message and does not include additional security header elements
Reference	ETSI TS 103 301 [1], clause 12
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is operating in secured mode and the IUT sending SREM ensure that when the IUT is requested to generate a SREM then the IUT sends a valid SREM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_SREM** and containing generationTime indicating realistic generation time and optionally containing generationLocation and not containing other header items	

5.2.4.1.9.2 Check the SREM Service Specific Permissions (SSP)

TP Id	TP_IS_TLCR_GEN_SSP_BV_01
Summary	Check that TLC service uses certificate containing valid Service Specific Permissions of type BitmapSsp to sign SREM messages and the SSP version is set to 2
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SREM with the certificate **CERT_SRM_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SREM** containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and not containing requests then the IUT sends a SREM signed with the **CERT_SRM_SSP_NONE**	

TP Id	TP_IS_TLCR_GEN_SSP_BV_02_00
Summary	Check that TLC service uses certificate containing valid Service Specific Permissions to sign SRM requests
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SREM with the certificate **CERT_SRM_SSP_REQ_NONE** containing appPermission item containing psid indicating **ITS_AID_SREM** containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating bit at position 0 of octet 1 set to 0x02 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and containing requests containing at least one item of type SignalRequestPackage then the IUT sends a SREM signed with the **CERT_SRM_SSP_REQ_NONE**	

TP Id	TP_IS_TLCR_GEN_SSP_BV_02_X
Summary	Check that TLC service uses certificate containing valid SSP permissions to sign SREM messages from different role ITS-S
Reference	ETSI TS 103 301 [1], clause 8.4.3.2
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED

Expected behaviour

with
the IUT being in the "SREM initial state"
and the IUT is operating in secured mode
and the IUT is authorized to sign SREM with the certificate **CERTIFICATE_X**
containing appPermission item
containing psid
indicating **ITS_AID_SREM**
containing bitmapSSP
indicating octet at position 0 set to 0x02
and indicating bit at position 0 of octet 1 set to 1
and indicating bit at position **SSP_BIT_X** set to 1
ensure that
when
the IUT is requested to generate a SREM
containing srm
containing requestor.type.role
indicating ***ROLE_X***
and containing requests
containing at least one item of type SignalRequestPackage
then
the IUT sends a SREM
signed with the **CERTIFICATE_X**

Variants

X	CERTIFICATE_X	SSP_BIT_X		Requestor role (ROLE_X)
		Octet Position	Bit Position	
01	CERT_IUT_SREM_SSP_01	1	1 (40h)	Requestor role (public transport) {SREM.srm.requestor.type.role.publicTransport}
02	CERT_IUT_SREM_SSP_02	1	2 (20h)	Requestor role (special transport) {SREM.srm.requestor.type.role.specialTransport}
03	CERT_IUT_SREM_SSP_03	1	3 (10h)	Requestor role (dangerousGoods) {SREM.srm.requestor.type.role.dangerousGoods}
04	CERT_IUT_SREM_SSP_04	1	4 (08h)	Requestor role (roadWork) {SREM.srm.requestor.type.role.roadWork}
05	CERT_IUT_SREM_SSP_05	1	5 (04h)	Requestor role (roadRescue) {SREM.srm.requestor.type.role.roadRescue}
06	CERT_IUT_SREM_SSP_06	1	6 (02h)	Requestor role (emergency) {SREM.srm.requestor.type.role.emergency}
07	CERT_IUT_SREM_SSP_07	1	7 (01h)	Requestor role (safetyCar) {SREM.srm.requestor.type.role.safetyCar}
08	CERT_IUT_SREM_SSP_08	2	0 (80h)	Requestor role (truck) {SREM.srm.requestor.type.role.truck}
09	CERT_IUT_SREM_SSP_09	2	1 (40h)	Requestor role (motorcycle) {SREM.srm.requestor.type.role.motorcycle}
10	CERT_IUT_SREM_SSP_10	2	2 (20h)	Requestor role (police) {SREM.srm.requestor.type.role.police}
11	CERT_IUT_SREM_SSP_11	2	3 (10h)	Requestor role (fire) {SREM.srm.requestor.type.role.fire}
12	CERT_IUT_SREM_SSP_12	2	4 (08h)	Requestor role (ambulance) {SREM.srm.requestor.type.role.ambulance}
13	CERT_IUT_SREM_SSP_13	2	5 (04h)	Requestor role (dot) {SREM.srm.requestor.type.role.dot}
14	CERT_IUT_SREM_SSP_14	2	6 (02h)	Requestor role (transit) {SREM.srm.requestor.type.role.transit}
15	CERT_IUT_SREM_SSP_15	2	7 (01h)	Requestor role (slowMoving) {SREM.srm.requestor.type.role.slowMoving}

16	CERT_IUT_SREM_SSP_16	3	0 (80h)	Requestor role (cyclist) {SREM.srm.requestor.type.role.cyclist}
17	CERT_IUT_SREM_SSP_17	3	1 (40h)	Requestor role (pedestrian) {SREM.srm.requestor.type.role.pedestrian}
18	CERT_IUT_SREM_SSP_18	3	2 (20h)	Requestor role (military) {SREM.srm.requestor.type.role.military}

TP Id	TP_IS_TLCR_GEN_SEC_BO_03_00
Summary	Check that TLC service does not send SREM without possession of the certificate with SREM signing permissions
Reference	ETSI TS 103 301 [1], clause 8.4.3.2
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SREM with the certificate **CERT_SRM_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SREM** containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating bit at position 0 of octet 1 set to 0 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and containing requests containing at least one item of type SignalRequestPackage then the IUT does not sends a SREM	

TP Id	TP_IS_TLCR_GEN_SEC_BO_03_X
Summary	Check that TLC service does not send SREM with priority request without possession of the certificate with prioritized SREM signing permissions
Reference	ETSI TS 103 301 [1], clause 8.4.3.2
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SREM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SREM with the certificate **CERT_SRM_SSP_REQ** containing appPermission item containing psid indicating **ITS_AID_SREM** and containing bitmapSSP indicating bit at position 0 of octet 1 set to 1 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SREM containing srm containing requests and containing requestor containing type containing role indicating **ROLE_X** then the IUT does not sends a SREM	
Variants	
The variants table defined in TP_IS_TLC_SEC_SND_BV_02_X shall apply for definition of **ROLE_X**.	

5.2.4.1.9.3 Check the pseudonym change behaviour

TP Id	TP_IS_TLCR_GEN_SEC_BV_05
Summary	Check that TLC service change the vehiculeID when certificate change is requested
Reference	CEN ISO/TS 19091 [3], clause 6.12
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	

with
the IUT being in the "SREM initial state"
and the IUT is operating in secured mode
and the IUT is recently having sent SREM
containing a correctly formatted Security Header as a EtsiTs103097Data structure
containing signedData.signer.certificate
indicating (***CERTIFICATE_1***)
and containing srm
containing requestor
containing id
indicating (***VID***)
ensure that
when
the IUT is having received pseudonym change request
and the IUT receives an *AppSREM_request* request from the application layer
then
the IUT sends a SREM
containing a correctly formatted Security Header as a EtsiTs103097Data structure
containing signedData.signer.certificate
indicating (***CERTIFICATE_2)***
and containing srm
containing requestor
containing id
indicating other value than ***VID***

TP Id	TP_IS_TLCR_GEN_SEC_BV_06
Summary	Check that TLC service keeps the vehiculeID when the request is active and certificate change is requested
Reference	CEN ISO/TS 19091 [3], clauses 6.2.9, 6.4.8 and 6.12
PICS Selection	PICS_SREM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	

with
the IUT being in the "SREM initial state"
and the IUT is operating in secured mode
and the IUT is recently having sent SREM
containing a correctly formatted Security Header as a EtsiTs103097Data structure
containing signedData.signer.certificate
indicating (***CERTIFICATE_1***)
and containing srm
containing requestor
containing id
indicating (***VID***)
and containing requests
containing an item of type SignalRequestPackage
containing request
containing id
indicating the target intersection ***TI***
and containing requestID
indicating (***ReqID)***
and containing requestType
indicating '*priorityRequest*'
ensure that
when
the IUT is having received pseudonym change request
and the IUT receives an *AppSREM_updatel* request from the application layer
then
the IUT sends a SREM
containing a correctly formatted Security Header as a EtsiTs103097Data structure
containing signedData.signer.certificate
indicating ***CERTIFICATE_1***
and containing srm
containing requestor
containing id
indicating ***VID***
and containing requests
containing an item of type SignalRequestPackage
containing request
containing id
indicating the target intersection ***TI***
and containing requestID
indicating value (***ReqID)***
and containing requestType
indicating '*priorityRequest*'

5.2.4.1.10 Check the SREM transmission rate

TP Id	TP_IS_TLCR_GEN_RATE_TI_01
Summary	Check that TLC service transmits the request with the valid rate
Reference	CEN ISO/TS 19091 [3], clause 6.14.1
PICS Selection	PICS_SREM_GENERATION AND PICS_SREM_TRANSMISSION_RATE
Expected behaviour	

with
the IUT being in the "SREM initial state"
and the IUT has sent previous SREM message at TIME_SREM_1
ensure that
when
the IUT is requested to repeat a SREM
then
the IUT sends SREM at TIME_SREM_2
where TIME_SREM_2 - TIME_SREM_1 is not less than 500 ms

5.2.4.2 Check the SREM reception behaviour

TP Id	TP_IS_TLCR_RCV_MSGF_BV_01
Summary	Check that the IUT can successfully process all mandatory fields of SREM received (TLC-S)
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" ensure that when the IUT having receive a valid SREM then the IUT forwards the SREM content to upper layers	

TP Id	TP_IS_TLCR_RCV_SSP_BV_01
Summary	Check that the secured IUT accepts the SREM message without requests and without specific requestor role
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and not containing requests and signed with the certificate containing appPermission item containing psid indicating **ITS_AID_SREM** then the IUT accepts the received SREM	

TP Id	TP_IS_TLCR_RCV_SSP_BV_02
Summary	Check that the secured IUT accepts the SREM message with request and without specific requestor role
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and containing requests and signed with the certificate **CERT_SRM_SSP_REQ** containing appPermission item containing psid indicating **ITS_AID_SREM** and containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating bit at position 0 of octet 1 set to 1 and indicating other bits set to 0 then the IUT accepts the received SREM	

TP Id	TP_IS_TLCR_GEN_SSP_BV_02_X
Summary	Check that the secured IUT accepts the SREM message with specific requestor role
Reference	ETSI TS 103 301 [1], clause 8.4.3.2
PICS Selection	PICS_SREM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SREM containing srm containing requestor.type.role indicating ***ROLE_X*** and signed with the certificate **CERT_SRM_SSP_X** containing appPermission item containing appPermission item containing psid indicating **ITS_AID_SREM** and containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating bit at position **SSP_BIT_X** set to 1 then the IUT accepts the received SREM	
Variants	
The variants table defined in TP_IS_TLC_SEC_SND_BV_02 shall apply.	

TP Id	TP_IS_TLCR_RCV_SSP_BO_01
Summary	Check that the secured IUT discards the SREM message without requests and without specific requestor role if signing certificate does not allow it
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and not containing requests and signed with the certificate **CERT_NONE** not containing appPermission item and containing psid indicating **ITS_AID_SREM** then the IUT discards the received SREM	

TP Id	TP_IS_TLCR_RCV_SSP_BO_02
Summary	Check that the secured IUT skips the SREM message with request and without specific requestor role if it is not allowed by the signing certificate
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SREM containing srm containing requestor.type.role indicating '*basicVehicle*' and containing requests and signed with the certificate **CERT_SRM_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_SREM** and containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating other bits set to 0 then the IUT skips the received SREM	

TP Id	TP_IS_TLCR_RCV_SSP_BO_03
Summary	Check that the IUT discards the SREM message containing request without additional information not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a SREM containing srm containing requestor.type.role indicating ***ROLE_X*** and signed with the certificate **CERT_SRM_SSP_NONE** containing appPermission item containing appPermission item containing psid indicating **ITS_AID_SREM** and containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating other bits set to 0 then the IUT discards the received SREM	
Variants	
The variants table defined in TP_IS_TLC_SEC_SND_BV_02 shall apply.	

5.2.4.3 Check the SSEM generation behaviour

5.2.4.3.1 Initial conditions

According to CEN ISO/TS 19091 [3], clause 6.11, the IUT shall conform to the following initial conditions:

```
the IUT has MAP information
    containing the configuration of the target intersection (TI)
        containing the approach information (AI)
the IUT has SPaT information
    containing the state of signal phases on the target intersection TI
```

These conditions constitute the "SSEM initial state".

5.2.4.3.2 Check the SSEM generation

TP Id	TP_IS_TLCS_GEN_MSGF_BV_01
Summary	Check that the IUT can generate the SSEM as a response to the received SREM
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_SSEM_GENERATION
Expected behaviour	
with the IUT being in the "SSEM initial state" ensure that when the IUT having receive a valid SREM then the IUT generates a SSEM	

5.2.4.3.3 Check that SSEM content

5.2.4.3.3.1 Check that SSEM protocol version is set to 1

TP Id	TP_IS_TLCS_GEN_MSGF_BV_02
Summary	Check that protocolVersion is set to 1 and messageID is set to 10 (TLC-S)
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_SSEM_GENERATION
Expected behaviour	
with the IUT being in the "SSEM 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'	

5.2.4.3.3.2 Check the SSEM content

TP Id	TP_IS_TLCS_GEN_MSGF_BV_03
Summary	Check that the IUT generates the SSEM containing SREM identifiers
Reference	CEN ISO/TS 19091 [3], clauses 6.11.3 and 6.11.6
PICS Selection	PICS_SREM_RECEPTION AND PICS_SSEM_GENERATION
Expected behaviour	
with the IUT being in the "SSEM initial state" ensure that when the IUT receives an SREM containing srm containing requestor containing id indicating ***VID*** and containing requests containing an item of type SignalRequestPackage containing request containing id indicating the target intersection ***TI*** and containing requestID indicating ***ReqID*** and containing requestType indicating '*priorityRequest*' then the IUT sends a valid SSEM containing ssm containing status containing an item of type SignalStatus containing id indicating the target intersection ***TI*** and containing sigStatus containing an item of type SignalStatusPackage containing requester containing requester containing id indicating ***VID*** and containing request indicating ***ReqID*** and containing sequenceNumber	

5.2.4.3.4 Check BTP type and port number

TP Id	TP_IS_TLCS_GEN_COM_BV_01
Summary	Check that SSEM uses BTP_B packet Check that the destination port for SSEM is set to 2008
Reference	ETSI TS 103 301 [1], clauses 10.2 and 8.4.3.3
PICS Selection	PICS_SREM_RECEPTION AND PICS_SSEM_GENERATION
Expected behaviour	
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'	

5.2.4.3.5 Check destination type

TP Id	TP_IS_TLCS_GEN_COM_BV_02
Summary	Check that TLM service encapsulates SSEM in a GBC with the HeaderType field set to the value of 4
Reference	ETSI TS 103 301 [1], clause 8.4.3.3
PICS Selection	PICS_SSEM_GENERATION AND PICS_SHORT_RANGE
Expected behaviour	
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'	

5.2.4.3.6 Check that the IUT increments the sequenceNumber only when the SSEM content is changed

TP Id	TP_IS_TLCS_GEN_EVUP_BV_01
Summary	Check that the IUT increments the sequenceNumber when a SSEM update is generated
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clause 6.11.2
PICS Selection	PICS_SREM_RECEPTION AND PICS_SSEM_GENERATION

Expected behaviour

with
- the IUT being in the "SSEM initial state"
- and the IUT having generate a SSEM
  - containing ssm
    - containing sequenceNumber
      - indicating (***SSEM_SN***)
    - and containing status
      - containing an item of type SignalStatus
        - containing id
          - indicating the target intersection ***TI***
        - and containing sigStatus
          - containing an item of type SignalStatusPackage
            - containing requester
              - containing requester
                - containing id
                  - indicating (***VID***)
                - and containing request
                  - indicating (***ReqID***)
                - and sequenceNumber
                  - indicating (***ReqSN***)

ensure that
- when
  - the IUT receives an SREM
    - containing srm
      - containing requestor
        - containing id
          - indicating ***VID***
      - and containing requests
        - containing an item of type SignalRequestPackage
          - containing request
            - containing id
              - indicating the target intersection ***TI***
            - and containing requestID
              - indicating ***ReqID***
            - and containing requestType
              - indicating '*priorityRequestUpdate*'
- then
  - the IUT sends a valid SSEM
    - containing ssm
      - containing sequenceNumber
        - indicating ***SSEM_SN*** + 1
      - and containing status
        - containing an item of type SignalStatus
          - containing id
            - indicating the target intersection ***TI***
          - and containing sigStatus
            - containing an item of type SignalStatusPackage
              - containing requester
                - containing requester
                  - containing id
                    - indicating ***VID***
                  - and containing request
                    - indicating ***ReqID***
                  - and sequenceNumber
                    - indicating ***ReqSN*** + 1

5.2.4.3.7 Check that the IUT does not increments the sequenceNumber when the SSEM content is not changed

TP Id	TP_IS_TLCS_GEN_EVUP_BV_02
Summary	Check that the IUT does not increments the sequenceNumber when a SSEM is not repeated without changes
Reference	ETSI TS 103 301 [1], clause 8.4.1 CEN ISO/TS 19091 [3], clause 6.11.2
PICS Selection	PICS_SREM_RECEPTION AND PICS_SSEM_GENERATION
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT having generate a SSEM containing ssm containing sequenceNumber indicating (***SSEM_SN***) and containing status indicating (***SSEM_STATUS***) ensure that when the IUT is triggered to repeat the SSEM then the IUT sends a valid SSEM containing ssm containing sequenceNumber indicating ***SSEM_SN*** and containing status indicating ***SSEM_STATUS***	

5.2.4.3.8 Check the SSEM security parameters

5.2.4.3.8.1 Check the SSEM ITS AID

TP Id	TP_IS_TLCS_GEN_SEC_BV_01
Summary	Check that TLC service uses certificate containing valid ITS AID to sign SSEM messages
Reference	ETSI TS 103 301 [1], clause 8.4.3.2
PICS Selection	PICS_SSEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT is operating in secured mode ensure that when the IUT is requested to generate a SSEM then the IUT sends a SSEM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_SSEM**	

TP Id	TP_IS_TLCS_GEN_SEC_BV_02
Summary	Check that TLC service uses generic security profile to sign SSEM message and does not include additional security header elements
Reference	ETSI TS 103 301 [1], clause 12
PICS Selection	PICS_SSEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT is operating in secured mode and the IUT sending SSEM ensure that when the IUT is requested to generate a SSEM then the IUT sends a valid SSEM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_SSEM** and containing generationTime indicating realistic generation time and optionally containing generationLocation and not containing other header items	

5.2.4.3.8.2 Check the SSEM Service Specific Permissions (SSP)

TP Id	TP_IS_TLCS_GEN_SSP_BV_01
Summary	Check that TLC service uses certificate containing valid Service Specific Permissions of type BitmapSsp to sign SSEM messages and the SSP version is set to 2
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_SSEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign SSEM with the certificate **CERT_SSM** containing appPermission item containing psid indicating **ITS_AID_SSEM** containing bitmapSSP indicating octet at position 0 set to 0x02 and indicating other bits set to 0 ensure that when the IUT is requested to generate a SSEM then the IUT sends a SSEM signed with the **CERT_SSM**	

5.2.4.3.9 Check the SSEM transmission rate and treatment delay

TP Id	TP_IS_TLCS_GEN_RATE_TI_01
Summary	Check that TLM service can process signal preferential treatment requests within the maximum response time
Reference	CEN ISO/TS 19091 [3], clause 6.14.2
PICS Selection	PICS_SSEM_GENERATION AND PICS_SSEM_TRATEMENT_DELAY
Expected behaviour	
with the IUT being in the "SSEM initial state" ensure that when the IUT has received SREM message at TIME_SREM then the IUT sends SSEM at TIME_SSEM where TIME_SSEM - TIME_SREM is less than 100ms	

TP Id	TP_IS_TLCS_GEN_RATE_TI_02
Summary	Check that TLM service broadcast the signal status message in response to a signal request message with the valid rate
Reference	CEN ISO/TS 19091 [3], clause 6.14.3
PICS Selection	PICS_SSEM_GENERATION AND PICS_SSEM_TRANSMISSION_RATE
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT has sent previous SSEM message at TIME_SSEM_1 ensure that when the IUT is requested to repeat a SSEM then the IUT sends SSEM at TIME_SSEM_2 where TIME_SSEM_2 - TIME_SSEM_1 is not less than 100 ms and not more than 2 s	

5.2.4.3.10 Check the SSEM repetition period

TP Id	TP_IS_TLCS_GEN_REP_01
Summary	Check that TLM service broadcast the signal status message in response to a signal request message until the requestor leaves the intersection
Reference	CEN ISO/TS 19091 [3], clause 6.14.4
PICS Selection	PICS_SSEM_GENERATION
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT has received SREM containing srm.requestor.id indicating ***VID*** and the IUT has already sent SSEM ensure that when the IUT received the SREM containing stationID indicating ***VID*** and indicating position inside or approaching the intersection then the IUT sends the SSEM containing srm.requestor.id indicating ***VID***	

TP Id	TP_IS_TLCS_GEN_REP_02
Summary	Check that TLM service stops to broadcast the signal status message in response to a signal request message when the requestor left the intersection
Reference	CEN ISO/TS 19091 [3], clause 6.14.4
PICS Selection	PICS_SSEM_GENERATION
Expected behaviour	
with the IUT being in the "SSEM initial state" and the IUT has received SREM containing srm.requestor.id indicating ***VID*** and the IUT has already sent SSEM ensure that when the IUT during 2 sec has not received the SREM containing stationID indicating ***VID*** then the IUT stops sending the SSEM containing srm.requestor.id indicating ***VID***	

5.2.4.4 Check the SSEM reception behaviour

TP Id	TP_IS_TLCS_RCV_MSGF_BV_04
Summary	Check that the IUT can successfully process all mandatory fields of SSEM received (ITS-S)
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SSEM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" and the IUT having send a valid SREM ensure that when the IUT receives a valid SSEM then the IUT forwards the SSEM content to upper layers and the IUT forwards the SSEM content to other facilities	

TP Id	TP_IS_TLCS_RCV_SSP_BV_05
Summary	Check that the IUT accepts the SSEM message permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SSEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT having send a valid SREM and the IUT is operating in secured mode ensure that when the IUT receives a SSEM signed with the certificate containing appPermission item containing psid indicating **ITS_AID_SSEM** then the IUT accepts the received SSEM	

TP Id	TP_IS_TLCS_RCV_SSP_BO_05
Summary	Check that the IUT discards the SSEM message not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 8.3
PICS Selection	PICS_SSEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT having send a valid SREM and the IUT is operating in secured mode ensure that when the IUT receives a SSEM signed with the certificate **CERT_NONE** not containing appPermission item containing psid indicating **ITS_AID_SSEM** then the IUT discards the received SSEM	

5.2.5 GNSS Positioning Correction (GPC) service

5.2.5.1 Check the RTCMEM format

5.2.5.1.1 Check the RTCMEM protocol version

TP Id	TP_IS_GPC_GEN_MSGF_BV_01
Summary	Check that protocolVersion is set to 1 and messageID is set to 'rtcmem'(13)
Reference	ETSI TS 103 301 [1], clause 9.3
PICS Selection	PICS_RTCMEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending RTCMEM ensure that when the IUT is requested to send a RTCMEM then the IUT sends a valid RTCMEM containing ITS PDU header containing protocolVersion indicating value '1' and containing messageID indicating value 'rtcmem' (13)	

5.2.5.1.2 Check the RTCMEM content

Void.

5.2.5.2 GPC service trigger, update, repetition and termination

TP Id	TP_IS_GPC_GEN_EVGN_BV_01
Summary	Check that GPC Service generates a new RTCMEM on reception of a valid AppRTCMEM_Start request
Reference	ETSI TS 103 301 [1], clause 9.4.2
PICS Selection	PICS_RTCMEM_GENERATION
Expected behaviour	
with the IUT being in the "RTCMEM initial state" and the IUT has not sent any RTCMEM yet ensure that when the IUT receives an AppRTCMEM_Start request from the application layer then the IUT sends a valid RTCMEM	

TP Id	TP_IS_GPC_GEN_EVGN_BV_02
Summary	Check that GPC Service terminates on reception of a valid AppRTCMEM_Stop request
Reference	ETSI TS 103 301 [1], clause 9.4.2
PICS Selection	PICS_RTCMEM_GENERATION AND PICS_RTCMEM_CAN_STOP
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending RTCMEM ensure that when the IUT receives an AppRTCMEM_Stop request from the application layer then the IUT stops sending RTCMEM	

5.2.5.3 Check BTP type and port number

TP Id	TP_IS_GPC_GEN_COM_BV_02
Summary	Check that RTCMEM uses BTP_B packet Check that the destination port for RTCMEM is set to 2013
Reference	ETSI TS 103 301 [1], clauses 10.2 and 9.4.3.2
PICS Selection	PICS_RTCMEM_GENERATION
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending RTCMEM ensure that when a RTCMEM is generated then the IUT sends a valid RTCMEM encapsulated in a BTP-B packet containing a destination port value set to 2013 and containing a destination port info value set to 0	

5.2.5.4 Check destination type

TP Id	TP_IS_GPC_GEN_COM_BV_03
Summary	Check that GPC service encapsulates RTCMEM in a GBC with the HeaderType field set to the value of 4
Reference	ETSI TS 103 301 [1], clause 9.4.3.2
PICS Selection	PICS_RTCMEM_GENERATION AND PICS_SHORT_RANGE
Expected behaviour	
with the IUT being in the "initial state" and the IUT sending RTCMEM ensure that when a RTCMEM is generated then the IUT sends a valid RTCMEM encapsulated in a GBC packet containing a correctly formatted Common Header containing HeaderType field indicating the value '4'	

5.2.5.5 GPC security parameters

5.2.5.5.1 Check GPC ITS AID value

TP Id	TP_IS_GPC_GEN_SEC_BV_01
Summary	Check that GPC service uses certificate containing valid ITS AID to sign RTCMEM messages
Reference	ETSI TS 103 301 [1], clause 9.4.3.2
PICS Selection	PICS_RTCMEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT sending RTCMEM ensure that when a RTCMEM is generated then the IUT sends a valid RTCMEM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_RTCMEM**	

TP Id	TP_IS_GPC_GEN_SEC_BV_02
Summary	Check that GPC service uses generic security profile to sign RTCMEM message and does not include additional security header elements
Reference	ETSI TS 103 301 [1], clause 12
PICS Selection	PICS_RTCMEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode and the IUT is sending RTCMEM ensure that when a RTCMEM is generated then the IUT sends a valid RTCMEM containing a correctly formatted Security Header as a EtsiTs103097Data structure containing signedData.tbsData.headerInfo containing psid indicating **ITS_AID_RTCMEM** and containing generationTime indicating realistic generation time and optionally containing generationLocation and not containing other header items	

5.2.5.5.2 Check GPC SSP version

TP Id	TP_IS_GPC_GEN_SSP_BV_01
Summary	Check that GPC service uses certificate containing valid Service Specific Permissions to sign RTCMEM messages and the SSP version is set to 1
Reference	ETSI TS 103 301 [1], clause 4.5.1
PICS Selection	PICS_RTCMEM_GENERATION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "RTCMEM initial state" and the IUT is operating in secured mode and the IUT is authorized to sign RTCMEM with the certificate **CERT_RTCM_SSP_NONE** containing appPermission item containing psid indicating **ITS_AID_RTCMEM** and containing bitmapSSP indicating octet at position 0 set to 0x01 and indicating other bits set to 0 ensure that when the IUT is requested to generate a RTCMEM then the IUT sends a RTCMEM signed with the **CERT_RTCM_SSP_NONE**	

5.2.5.6 Check RTCMEM reception

TP Id	TP_IS_GPC_RCV_MSGF_BV_01
Summary	Check that the IUT can successfully process all mandatory fields of RTCMEM received
Reference	ETSI TS 103 301 [1], clause 9.3
PICS Selection	PICS_RTCMEM_RECEPTION
Expected behaviour	
with the IUT being in the "initial state" ensure that when the IUT receives a valid RTCMEM then the IUT forwards the RTCMEM content to upper layers and the IUT forwards the RTCMEM content to other facilities	

TP Id	TP_IS_GPC_RCV_SSP_BV_01
Summary	Check that the IUT accepts the RTCMEM message permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 9.3
PICS Selection	PICS_RTCMEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a RTCMEM signed with the certificate containing appPermission item containing psid indicating **ITS_AID_RTCMEM** then the IUT accepts the received RTCMEM	

TP Id	TP_IS_GPC_RCV_SSP_BO_02
Summary	Check that the IUT discards the RTCMEM message not permitted by the signing certificate
Reference	ETSI TS 103 301 [1], clause 9.3
PICS Selection	PICS_RTCMEM_RECEPTION AND PICS_IS_IUT_SECURED
Expected behaviour	
with the IUT being in the "initial state" and the IUT is operating in secured mode ensure that when the IUT receives a RTCMEM signed with the certificate containing psid indicating **ITS_AID_RTCMEM** and not containing appPermission item then the IUT discards the received RTCMEM	

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