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Intelligent Transport Systems (ITS);
Communications Access for Land Mobiles (CALM);
Test specifications for non-IP networking (ISO 29281);
Part 3: Abstract Test Suite (ATS) and partial PIXIT proforma

Reference
RTS/ITS-00271

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Contents

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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 3 of a multi-part deliverable covering Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281), as identified below:

Part 1: "Protocol Implementation Conformance Statement (PICS) proforma";

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

Part 3: "Abstract Test Suite (ATS) and partial PIXIT proforma".

1 Scope

The present document provides the Abstract Test Suite (ATS) and partial PIXIT proforma for the protocols specified in ISO 29281-1 [1] based on the related TSS & TP specification [3] and the PICS proforma [2], and in accordance with the relevant guidance given in ISO/IEC 9646-1 [4], ISO/IEC 9646-2 [5], ETS 300 406 [6] and EG 202 798 [i.1].

2 References

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

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

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

2.1 Normative references

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

[1] ISO 29281-1:2013: "Intelligent transport systems -- Communication access for land mobiles (CALM) -- Non-IP networking -- Part 1: Fast networking & transport layer protocol (FNTP)".

[2] ETSI TS 102 985-1: "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 1: Protocol implementation conformance statement (PICS) proforma".

[3] ETSI TS 102 985-2: "Intelligent Transport Systems (ITS); Communications Access for Land Mobiles (CALM); Test specifications for non-IP networking (ISO 29281); Part 2: Test Suite Structure and Test Purposes (TSS&TP)".

[4] ISO/IEC 9646-1:1994: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".

[5] ISO/IEC 9646-2:1994: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

[6] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[7] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".

[8] ETSI ES 201 873-7: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 7: Using ASN.1 with TTCN-3".

[9] ETSI ES 201 873-2: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 2: TTCN-3 Tabular presentation Format (TFT)".

2.2 Informative references

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

[i.1] ETSI EG 202 798: "Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing".

[i.2] ISO 21217: "Intelligent transport systems -- Communications access for land mobiles (CALM) -- Architecture".

[i.3] ISO 24102-3: "Intelligent transport systems -- Communications access for land mobiles (CALM) -- ITS station management -- Part 3: Service access points".

[i.4] ISO 24102-4: "Intelligent transport systems -- Communications access for land mobiles (CALM) -- ITS station management -- Part 4: Station internal management communications".

[i.5] ISO 21218: "Intelligent transport systems -- Communications access for land mobiles (CALM) -- Access technology support".

[i.6] ETSI TR 103 099 (V1.1.1): "Intelligent Transport Systems (ITS);Architecture of conformance validation framework".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ISO 29281-1 [1], TS 102 985-1 [2], TS 102 985-2 [3], ISO/IEC 9646-1 [4], ISO/IEC 9646-2 [5], ETS 300 406 [6], ES 201 873-1 [7], ES 201 873-7 [8], EG 202 798 [i.1], ISO 21217 [i.2], ISO 24102-3 [i.3], ISO 24102-4 [i.4] and ISO 21218 [i.5] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ISO 29281-1 [1], TS 102 985-1 [2], TS 102 985-2 [3], ISO/IEC 9646-1 [4], ISO/IEC 9646-2 [5], ETS 300 406 [6], ES 201 873-1 [7], ES 201 873-7 [8], EG 202 798 [i.1], ISO 21217 [i.2], ISO 24102-3 [i.3], ISO 24102-4 [i.4] and ISO 21218 [i.5] apply.

4 Abstract test method

4.1 Abstract protocol tester

In general, the conformance test system architecture as illustrated in the ITS testing framework [i.1], see figure 1, applies. For the present document, the IUT is the FNTP. The upper tester application allows accessing the NF-SAP of the IUT. Lower layer protocols indicated by the block "ITS lower layers" allow access to the IUT from the lower side.

NOTE 1: There is also the need and possibility to configure the IUT by the ITS test system. This feature is not illustrated in figure 1, but is presented in figure 5.

The test system simulates valid and invalid protocol behaviour, and analyses the reaction of the IUT.

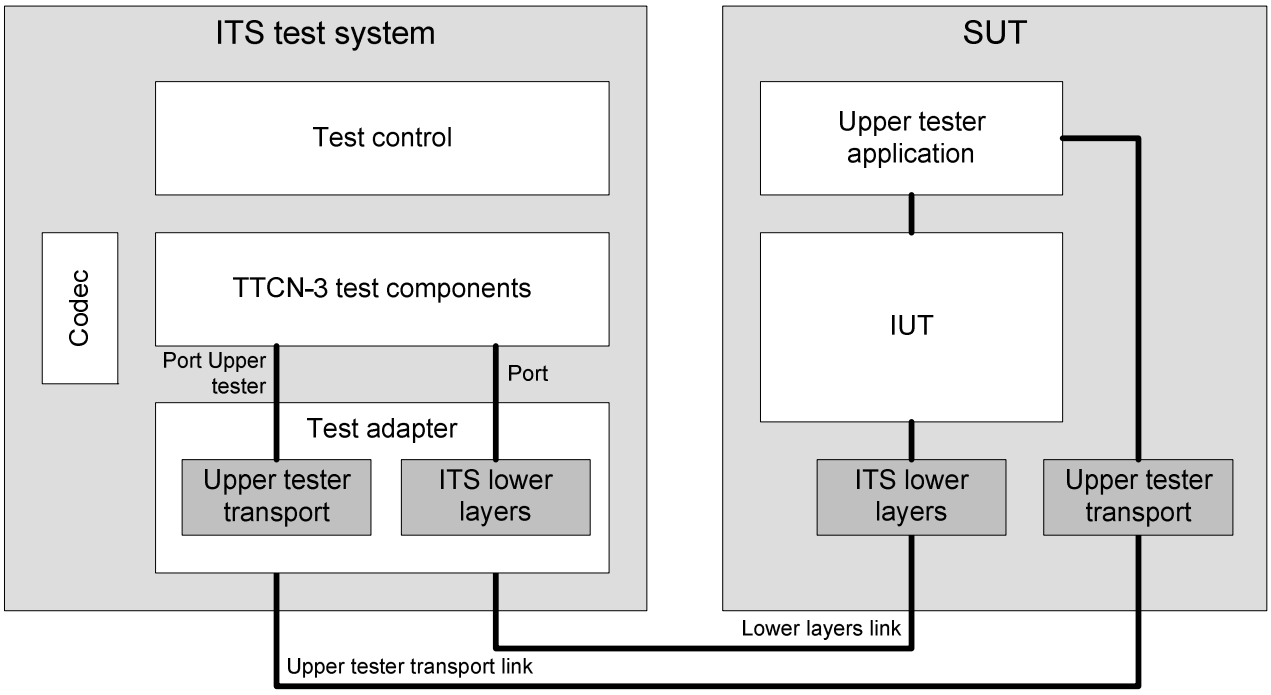


Figure 1: Abstract protocol tester - General approach

SUTs which support the "ITS station-internal management communications protocol" (IICP) [i.4] may benefit from the conformance test system architecture illustrated in figure 2, where the access to the IUT from top, i.e. in general via the upper tester application, is performed via the MN-SAP applying the MN-Command "UpTest_NF_Cmd" [i.3]. Similarly, access of the networking & transport layer protocol to the ITS facilities layer (Upper tester application) is possible via MN-SAP applying the MN-Request "UpTest_NF_Req" [i.3].

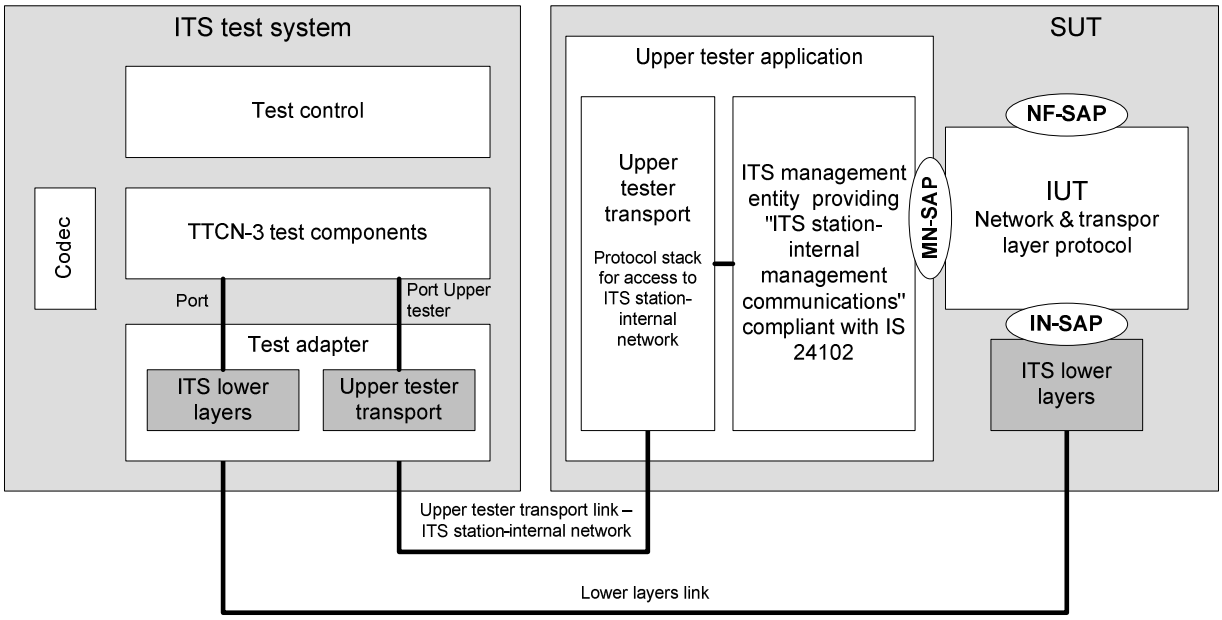


Figure 2: Abstract protocol tester - IICP approach

NOTE 2: In CALM-compliant implementations, in addition to the upper tester access, configuration of the IUT by the ITS test system is also done via the ITS station-internal network. This feature is illustrated in figure 5.

4.2 Test configurations

4.2.1 Roles of an ITS-SCU

This test suite uses two test configurations in order to cover the different test scenarios. Distinction between the two configurations is given by the two possible implementation scenarios for an ITS station, i.e. a single-unit implementation, or an implementation with several "ITS station communication units" (ITS-SCU) which are interconnected via an ITS station-internal network [1] and [i.2]. These ITS-SCUs can take over the roles of an ITS-S host, or an ITS-S router, or the combined role of ITS-S host and ITS-S router. These two identified testing configurations are referred to as CF01 for the single unit implementation illustrated in figure 3, and CF02 for the multi-unit implementation illustrated in figure 4, and are described in clause 4.2.2 and clause 4.2.3.

4.2.2 Test configuration CF01: No ITS station-internal network

In test configuration CF01, the roles of ITS-S host and ITS-S router are implemented in a single ITS-SCU as illustrated in figure 3. Consequently the whole supported functionality of FNTP is given in a single ITS-SCU, and no station-internal forwarding between ITS-S host and ITS-S router is needed.

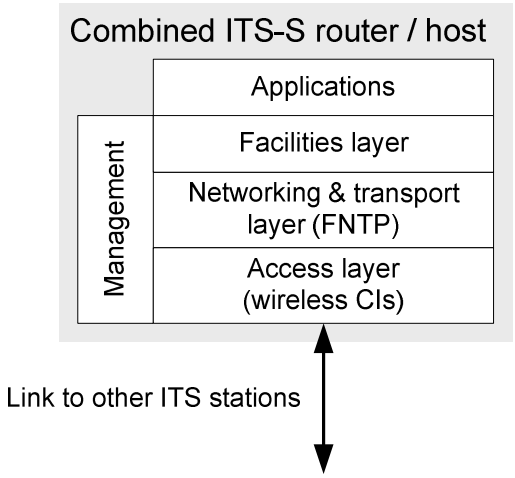


Figure 3: Test configuration CF01 architecture

In this test configuration, the FNTP is connected only to communication interfaces (CI) which establish a link to another instance of an ITS station. Such CIs provide "virtual communication interfaces" (VCIs) for MAC broadcast communications, multicast communications and unicast communications. Details on VCIs, and how the ITS-S access layer is connected to the ITS-S networking & transport layer via the IN-SAP are specified in [i.5]. The following address elements contained in the element LinkID specified in [i.5] are used:

- LocalCIID, identifying uniquely a CI, specified in the following PIXIT variable:

  PX_WL_LOCAL_CIID.

- RemoteCIID, identifying VCI for broadcast communications in destination_address.RemoteCIID of the IN-UNITDATA.request service primitive, specified in the following PIXIT variable:

  PX_WL_REMOTE_CIID_BC

- RemoteCIID, identifying VCI for multicast communications in destination_address.RemoteCIID of the IN-UNITDATA.request service primitive, specified in the following PIXIT variable:

  PX_WL_REMOTE_CIID_MC

- RemoteCIID, identifying a VCI for unicast communications in destination_address.RemoteCIID of the IN-UNITDATA.request service primitive / source_address.RemoteCIID of the IN-UNITDATA.indication service primitive, specified in the following PIXIT variable:

  PX_WL_REMOTE_CIID_UC.

Note that for every know peer ITS station, a distinct VCI identified by destination_address.RemoteCIID of the IN-UNITDATA.request service primitive / source_address.RemoteCIID of the IN-UNITDATA.indication service primitive is given.

This configuration is used in the cases listed below [3]:

- ITS-S station internal-network PICS (PICS_S_INW) is set to false.
- The roles PICS (PICS_ROLE_RH) is set to true.

4.2.3 Test configuration CF02: ITS station-internal network

In test configuration CF02, the roles of ITS-S host and ITS-S router may be implemented in different ITS-SCUs as illustrated in figure 4. It is considered for testing that the functionality of FNTP is separated into two parts, one part available in an ITS-SCU with the role of an ITS-S host, and one part available in an ITS-SCU with the role of an ITS-S host. Further on, presence of an ITS station-internal network is required.

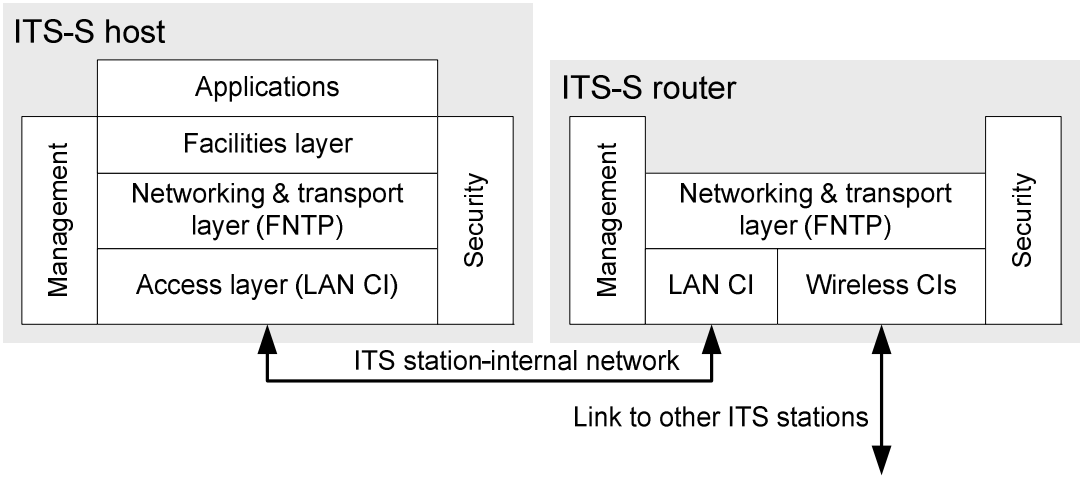


Figure 4: Test configuration CF02 architecture

In this test configuration, the FNTP part located in the ITS-SCU with role of an ITS-S router is connected to communication interfaces (CI) which establish a link to another instance of an ITS station, and to a communication interface which establishes the connection to the ITS station internal network. The following address elements contained in the element LinkID specified in [i.5] are used:

- To connect to the ITS station-internal network with IN-UNITDATA.request service primitive:
  - LocalCIID, identifying uniquely a CI to connect to another ITS station, specified in the following PIXIT variable:

    PX_LAN_LOCAL_CIID

  - RemoteCIID, identifying VCI for broadcast communications in destination_address.RemoteCIID of the IN-UNITDATA.request service primitive, specified in the following PIXIT variable:

    PX_LAN_REMOTE_CIID_BC

  - RemoteCIID, identifying VCI for unicast communications in source_address.RemoteCIID of the IN-UNITDATA.indication service primitive, specified in the following PIXIT variable:

    PX_LAN_REMOTE_CIID_UC

Note that communications on the ITS station-internal network could also be unicast communications.

- To connect to another ITS station, see test configuration CF01.

Note that for every known peer ITS station, a distinct VCI is given.

This configuration is used in the cases listed below [2]:

- ITS-S station internal-network PICS (PICS_S_INW) is set to true.
- Either one of the roles PICS (PICS_ROLE_RH, PICS_ROLE_RONLY, PICS_ROLE_HONLY) is set to true.

4.3 Test architecture

The present document implements the general TTCN-3 test architecture described in EG 202 798 [i.1], clause 6.3.2 and clause 8.3.1.

Figure 5 shows the TTCN-3 test architecture used for the FNTP ATS.

- The MTC is of type ItsFNTP and communicates with the SUT over fntpPort in order to exchange FNTP NPDUs between the FNTP test component and the FNTP IUT. The "ITS lower layers transport" system adapter is used to enable usage of ITS lower layers in the SUT in case the IN-SAP is not directly accessible.
- The MTC communicates with the SUT over the utPort in order to trigger FNTP functionalities by simulating primitives from e.g. application or LDM entities. It is required to trigger the FNTP layer in the SUT to send FNTP messages, which are resulting from upper layer primitives. Furthermore, receiving FNTP messages may result for the FNTP layer in sending primitives to the upper layer. The "Upper tester transport" system adapter is used to adapt to the upper tester application implementation of the SUT.
- The MTC communicates with the SUT over the cfPort in order to perform settings in the SUT. The "Configuration transport" system adapter is used to adapt to the configuration access implementation of the SUT.

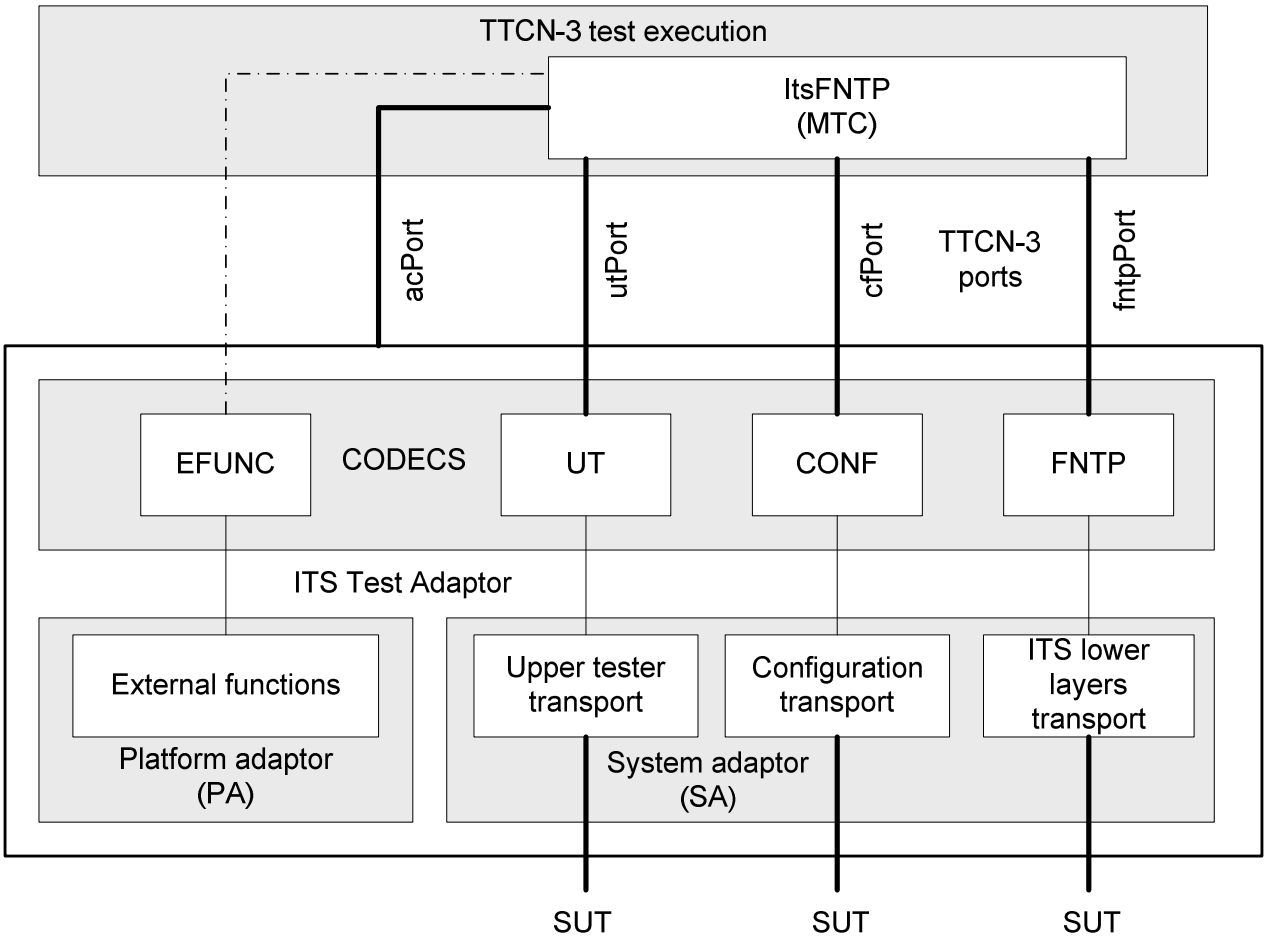


Figure 5: Test system architecture

NOTE: In CALM-compliant implementations, "Upper tester transport" and "Configuration Transport" may map on the same ITS station-internal network.

4.4 Ports and abstract service primitives

4.4.1 Overview

The following TTCN-3 ports are used by the FNTP ATS:

- The fntpPort of type FntpPort is used to receive messages from and transmit messages to the IUT (via IN-SAP).
- The utPort of type UpperTesterPort is used to receive service data units from and transmit service data units to the IUT (via NF-SAP).
- The cfPort of type CfPort is used to configure the FNTP (via MN-SAP).
- The acPort of type AdapterControlPort is not used.

Every port provides "Abstract Service Primitives" (ASPs) as specified in the following clauses.

4.4.2 ASPs of the fntpPort

Two ASPs are used in the fntpPort:

- The INsapPrimitivesUp primitive used to send messages of type FNTPNPDU to the IUT.
- The INsapPrimitivesDown primitive used to receive messages of type FNTPNPDU from the IUT.

4.4.3 ASPs of the utPort

The following ASPs are used in the utPort:

- The UtInitialize primitive is used to initialize IUT.
- The UtFntpEvent primitive is used to send NF-SAP service primitives to the IUT.
- The UtFntpEventInd primitive is used to receive NF-SAP service primitives from the IUT.

4.4.4 ASPs of the cfPort

This port is used to monitor notifications from the IUT.

- The CfFntpEventInd primitive is used to receive messages at the MN-SAP.

5 ATS conventions

5.1 Testing conventions

5.1.1 Testing states

5.1.1.1 Initial state

All test cases start with the function f_prInitialState. This function brings the IUT in an "initialized" state by invoking the upper tester primitive UtInitialize.

5.1.1.2 Final state

All test cases end with the function f_poDefault. This function brings the IUT back in an "idle" state. As no specific actions are required for the idle state in the base standard ISO 29281-1 [1], the function f_ poDefault does not invoke any action.

As necessary, further actions may be included in the f_poDefault function.

5.1.2 Message types - ASN.1 definitions

Message types are defined in ASN.1. ASN.1 definitions from the base standard ISO 29281-1 [1] are directly imported in TTCN-3 using the ASN.1 import method specified in ES 201 873-7 [8].

The following example shows the TTCN-3 import statement used to import ASN.1 definitions from ISO 29281-1 [1] in the TTCN-3 modules:

```
import from CALMfntp language "ASN.1:1997" all;
```

5.2 Naming conventions

5.2.1 General guidelines

This test suite follows the naming convention guidelines provided in EG 202 798 [i.1].

5.2.2 Usage of Log statements

All TTCN-3 log statements use the following format:

- Three asterisks followed by a blank character.
- The TTCN-3 test case or function identifier in which the log statement is defined followed by a colon and a blank character.
- One of the possible log categories: INFO, WARNING, ERROR, PASS, FAIL, INCONC, TIMEOUT followed by a colon and a blank character.
- Free text.
- A blank character followed by three asterisks.

EXAMPLE 1:

log("*** TC_FNTP_TXP_BP_BV_01: INFO: Preamble: FNTP Forwarding Table was setup properly ***");

Furthermore, the following rules are applied for the Fntp ATS:

- Log statements are used in the body of the functions, so that invocations of functions are visible in the test logs.
- All TTCN-3 setverdict statements are combined with a log statement following the same above rules (see example 2).

EXAMPLE 2:

setverdict(pass, "*** _FNTP_TXP_BP_BV_01: PASS: Received basic FNTP NPDU ***");

5.2.3 Test Case (TC) identifier

Table 1 shows the test case naming convention, which follows the same naming convention as the test purposes.

Table 1: TC naming convention

TC_<root>_<gr>_<sgr>_<x>_<nn>		
<root> = root	FNTP	Fast Networking & Transport Protocol
<gr> = group	TXP	Transmit Packets
	RXP	Receive Packets
	CIP	CIP Management
	INIT	Initialization and maintenance
<sgr> = sub-group	BP	Basic Procedure
	EP	Extended Procedure
	FP	Forwarding Procedure
	GE	General
<x> = type of testing	BV	Valid Behaviour tests
	BI	Invalid Syntax or Behaviour Tests
<nn> = sequential number		01 to 99
NOTE 1: CIP management is only tested in the TPs of group "CIP". NOTE 2: The groups TXP and RXP are restricted to "transmit to / receive from an ITS peer station", i.e. the group TXP also includes TPs to test reception of an FNTP station-internal forwarding NPDU from another local ITS-SCU, and the group RXP also includes TPs to test transmission of an FNTP station-internal forwarding NPDU to another local ITS-SCU. NOTE 3: A sub-group may not apply for all groups.		

EXAMPLE: TP identifier: TP/FNTP/TXP/BP/BV/01
TC identifier: TC_FNTP_TXP_BP_BV_01.

Annex A (normative): Partial PIXIT proforma for FNTP

A.1 Identification summary

Table A.1

PIXIT Number:	
Test Laboratory Name:	
Date of Issue:	
Issued to:	

A.2 ATS summary

Table A.2: Summary

Protocol Specification:	ISO 29281-1 [1]
Protocol to be tested:	FNTP
ATS Specification:	TS 102 985-3
Abstract Test Method:	Clause 4

A.3 Test laboratory

Table A.3: Test laboratory

Test Laboratory Identification:	
Test Laboratory Manager:	
Means of Testing:	
SAP Address:	

A.4 Client identification

Table A.4: Client identification

Client Identification:	
Client Test manager:	
Test Facilities required:	

A.5 SUT

Table A.5: SUT identification

Name:	
Version:	
SCS Number:	
Machine configuration:	
Operating System Identification:	
IUT Identification:	
PICS Reference for IUT:	
Limitations of the SUT:	
Environmental Conditions:	

A.6 Protocol layer information

A.6.1 Protocol identification

Table A.6: Protocol identification

Name:	ISO 29281-1 [1]
Version:	
PICS References:	TS 102 985-1 [2]

A.6.2 IUT information

Table A.7: Fntp Pixits

Identifier	Description	
PX_SERVICE_REF	Comment	A number uniquely identifying the endpoint at this host in an implementation specific way
	Type	ServiceRef
	Def. value	itsaid:= { content := 8 }, instance := 0, // Allows for 256 instances of this app flowNo := 0
PX_ITS_FPDU	Comment	ITS-SP payload
	Type	ITSfpdu
	Def. value	A DENM message associated to a Slow vehicle in ASN.1 PER encoding
PX_USER_PRIORITY	Comment	The user priority as specified in ISO 21218 [i.5]
	Type	UserPriority
	Def. value	0
PX_HOST_SCU_ID	Comment	ITS-SCU-ID of the host ITS-SCU
	Type	ITS_scuId
	Def. value	8
PX_UNKNOWN_HOST_SCU_ID	Comment	ITS-SCU-ID of an unknown host ITS-SCU
	Type	ITS_scuId
	Def. value	65534
PX_WL_LOCAL_CIID	Comment	Identifies the CI on ITS-S router
	Type	EUI64
	Def. value	'0A0B0CFFFE0D0E0F'O
PX_WL_REMOTE_CIID	Comment	Identifies the CI on ITS-S router
	Type	EUI64
	Def. value	'0A0B0CFFFE0D0E0F'O
PX_WL_REMOTE_CIID_BC	Comment	Identifies an unknown CI on ITS-S router
	Type	EUI64
	Def. value	'FFFFFFFFFEFFFFFF'O
PX_WL_REMOTE_CIID_MC	Comment	Identifies the VCI for broadcast on ITS-S router
	Type	EUI64
	Def. value	'EF0008FFFF011234'O
PX_WL_REMOTE_CIID_UC	Comment	Identifies the VCI for multicast on ITS-S router
	Type	EUI64
	Def. value	'030008FFFE010001'O
PX_WL_REMOTE_CIID_UNKNOWN_UC	Comment	Identifies the VCI for multicast on ITS-S router
	Type	EUI64
	Def. value	'030008FFFF020001'O
PX_WL_REMOTE_CIID_UNKNOWN_BC	Comment	Identifies an unknown CI on ITS-S router
	Type	EUI64
	Def. value	'FF0008FFFF02FFFF'O
PX_WL_LOCAL_CIID_UNKNOWN	Comment	Identifies the VCI for unicast on ITS-S router
	Type	EUI64
	Def. value	'030008FFFF020000'O

Identifier	Description	
PX_LAN_LOCAL_CIID	Comment	Identifies the CI on ITS-S host
	Type	EUI64
	Def. value	'03000AFFFFFF0000'O
PX_LAN_REMOTE_CIID_BC	Comment	Identifies an unknown CI on ITS-S host
	Type	EUI64
	Def. value	'FF000AFFFFFFFFFF'O
PX_LAN_DIFFERENT_LOCAL_CIID	Comment	Identifies a different VCI on ITS-S host
	Type	EUI64
	Def. value	'03000AFFFFFE0000'O
PX_DEST_LOCAL_CIID	Comment	Identifies uniquely a specific CI in a specific "ITS-SCU"
	Type	EUI64
	Def. value	'030009FFFF010000'O
PX_DEST_REMOTE_CIID_BC	Comment	Identifies uniquely a specific VCI in a specific "ITS-SSCU" for broadcast
	Type	EUI64
	Def. value	'FFFFFFFFFEFFFFFF'O
PX_DEST_REMOTE_CIID_MC	Comment	Identifies uniquely a specific VCI in a specific "ITS-SCU" for multicast
	Type	EUI64
	Def. value	'F30009FFFF010001'O
PX_DEST_REMOTE_CIID_UC	Comment	Identifies uniquely a specific VCI in a specific "ITS-SCU" for unicast
	Type	EUI64
	Def. value	'030009FFFE010001'O
PX_DEST_SECOND_REMOTE_CIID_UC	Comment	Identifies uniquely a second VCI in a specific "ITS-SCU" for unicast
	Type	EUI64
	Def. value	'040002FFFE010005'O
PX_WL_LINK_ID_BC	Comment	Identify the VCI to be used to transmit the packet outside (e.g. G5), i.e. the peer station, for Broadcast,
	Type	Link_ID

	Def. value	{
		remoteCIID := PX_WL_REMOTE_CIID_BC,
		localCIID := PX_WL_LOCAL_CIID
		}

PX_LAN_LINK_ID_BC	Comment	Identify the VCI to be used to transmit the packet to the LAN, for Broadcast
	Type	Link_ID

	Def. value	{
		remoteCIID := PX_LAN_REMOTE_CIID_BC,
		localCIID := PX_LAN_LOCAL_CIID
		}

PX_WL_LINK_ID_UNKWNON_BC	Comment	Identify an unknown VCI to be used to transmit the packet, i.e. the peer station, for Broadcast
	Type	Link_ID

	Def. value	{
		remoteCIID := PX_WL_REMOTE_CIID_UNKNOWN_BC,
		localCIID := PX_WL_LOCAL_CIID_UNKNOWN
		}

PX_WL_LINK_ID_UNKWNON_UC	Comment	Identify an unknown VCI to be used to transmit the packet, i.e. the peer station, for Unicast
	Type	Link_ID

	Def. value	{
		remoteCIID :=PX_WL_REMOTE_CIID_UNKNOWN_UC,
		localCIID := PX_WL_LOCAL_CIID_UNKNOWN
		}

PX_WL_LINK_ID_UC	Comment	Identify the VCI to be used to transmit the packet, i.e. the peer station, for Unicast

Identifier	Description	
	Type	Link_ID

	Def. value	{
		remoteCIID := PX_WL_REMOTE_CIID_UC,
		localCIID := PX_WL_LOCAL_CIID
		}

PX_APP_ PORT_NUMBER	Comment	Indicate the application port number, used instead of c_portDyn
	Type	PortNumber
	Def. value	{ portLong := 12345 }
PX_LOCAL_PORT_NUMBER	Comment	Indicate the source port number, i.e. the local endpoint
	Type	PortNumber
	Def. value	{ portLong := 5555 }
PX_REMOTE_PORT_NUMBER	Comment	Indicate the destination port number, i.e. the local endpoint
	Type	PortNumber
	Def. value	{ portLong := 5556 }
PX_SECOND_REMOTE_PORT_NUMBER	Comment	Indicate a second destination port number
	Type	PortNumber
	Def. value	{ portLong := 5557 }
PX_UNKNOWN_REMOTE_PORT_NUMBER	Comment	Indicate the destination port number, i.e. the peer ITS-SP
	Type	PortNumber
	Def. value	{ portLong := 666 }
PX_FORWARDING_SRC_PORT	Comment	Indicate the forwarding source port number, i.e. the originator endpoint
	Type	PortNumber
	Def. value	{ portLong := 5550 }
PX_FORWARDING_DST_PORT	Comment	Indicate the forwarding destination port number, i.e. the destinator endpoint
	Type	PortNumber
	Def. value	{ portLong := 5551 }
PX_SERVICE_PORT	Comment	Indicate the forwarding destination port number, i.e. the destinator endpoint
	Type	PortNumber
	Def. value	{ portLong := 32700 }
PX_HOP	Comment	Single hop value
	Type	FNTPhopCount
	Def. value	0
PX_NHOPS	Comment	N-hops value
	Type	FNTPhopCount
	Def. value	5
PX_CIP_RX_SETTINGS	Comment	Access parameters settings for reception
	Type	RXcip
	Def. value	'CAFEDECA'O
PX_CIP_TX_SETTINGS	Comment	Access parameters settings for transmission
	Type	TXcip
	Def. value	'C0CAC01A'O
PX_ACCESS_PARAMETERS_SETTINGS	Comment	Access parameters description
	Type	AccessParameters

Identifier	Description	

	Def. value	{
		apRef := 0,
		aParameter := { NullType := NULL }
		}

Annex B (normative): TTCN-3 library modules

B.1 Electronic annex, zip file with TTCN-3 code

This ATS has been produced using the Testing and Test Control Notation (TTCN) according to ES 201 873-2 [9]. The ATS was developed on a separate TTCN software tool.

This test suite has been compiled error-free using three different commercial TTCN-3 compilers.

The TTCN-3 library modules, which form parts of the present document, are contained in archive ts_10298503v010201p0.zip which accompanies the present document.

B.2 Extensions of Architecture of conformance validation framework

Validation of this ATS required some enhancement of the Architecture of conformance validation framework, TR 103 099 [i.6].

B.2.1 Test Adapter

A configuration port was added to monitor notification on MX-SAP.

B.2.2 Lower Tester

Figure B.1 presents the simplified class diagram of the test adapter. For better readability, auxiliary classes such as factories are not represented.

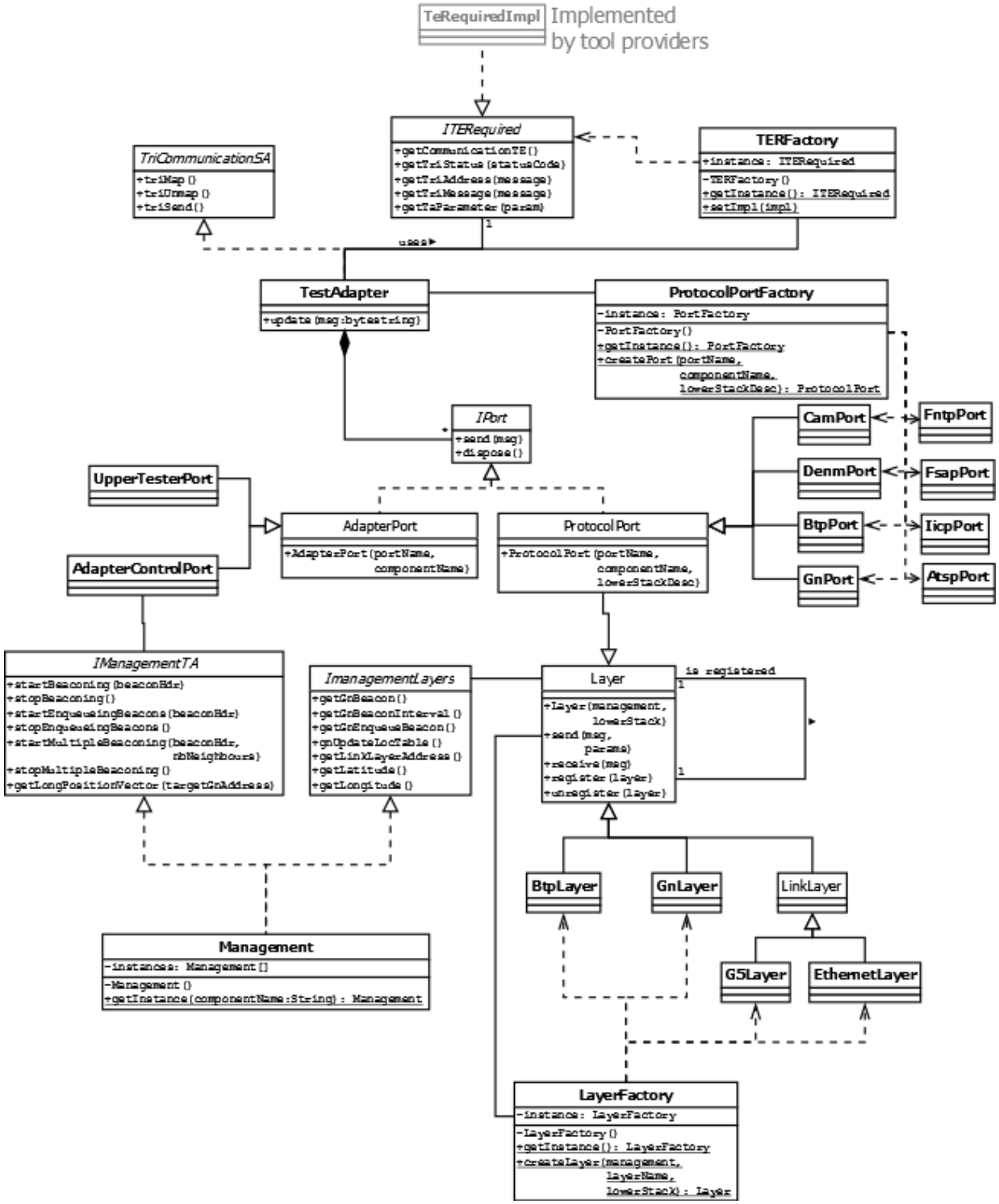


Figure B.1: Test Adapter class diagram

Currently the following layers have been implemented:

- FntpLayer: basic functionalities of FNTP layer
- FsapLayer: basic functionalities of FSAP layer, including SAM transmission in case of service user role

- IicpLayer: basic functionalities of IICP protocol layer
- AtspLayer: basic functionalities of ATSP layer

The following AC primitives are used to control the dynamic configuration of the various layers:

AC Primitive	Description
startSamTransmission	Requests Test Adapter to start SAM transmission
stopSamTransmission	Requests Test Adapter to stop SAM transmission

B.2.3 Dispatcher

The dispatcher is used to organize the connection between the ports of the test system and the IICP port of the IUT. It offers three communication ports to the test system.

- UT port
- LT port
- CF port

The communication with the IUT is handled by a single port using IICP protocol [i.4].

Incoming messages from UT, LT or CF ports are encapsulated into IICP message frames and forwarded to the IUT via the IICP port.

Messages received via IICP port are partly analysed and the contained payload is forwarded to one of the three test system ports depending on the configuration and the IICP message identifier.

B.2.4 Codecs source code

The software modules are contained in archive AnnexB_Codec.zip which is included in archive ts_10298503v010201p0.zip which accompanies the present document.

B.2.5 Test Adapter source code

The software modules are contained in archive AnnexB_Adapter.zip which is included in archive ts_10298503v010201p0.zip which accompanies the present document.

B.2.6 Dispatcher source code

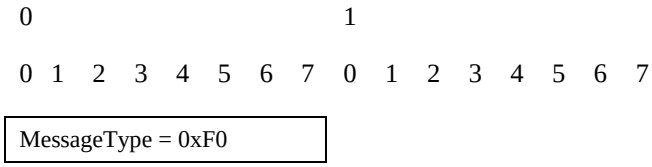
The software modules are contained in archive AnnexB_Dispatcher.zip which is included in archive ts_10298503v010201p0.zip which accompanies the present document.

B.3 Upper Tester message format

B.3.1 FNTP Upper Tester Primitives

B.3.1.1 FntpInitialize

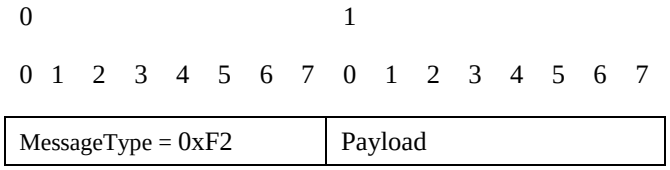
This message is used to request initialization of FNTP implementation.



Name	Length	Value
MessageType	1 byte	0xF0
Settings	3 bytes	

B.3.1.2 FntpPortCreationRequest

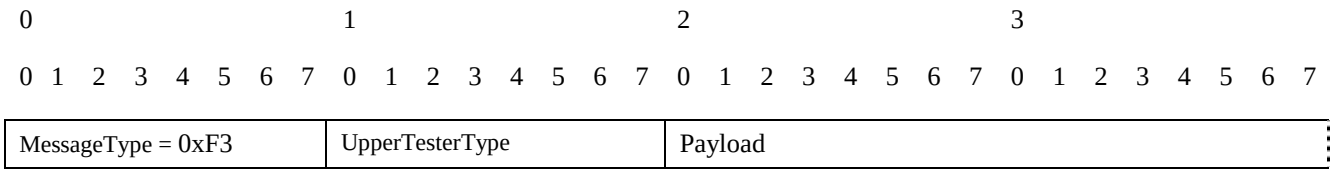
This message is used to request FNTP to create a new port/socket (see ISO/CD 29281-1 [1], clause 8.2.1).



Name	Length	Value
MessageType	1 byte	0xF2
Payload	Variable	Packet's final payload

B.3.1.3 FntpPortCreationConfirm

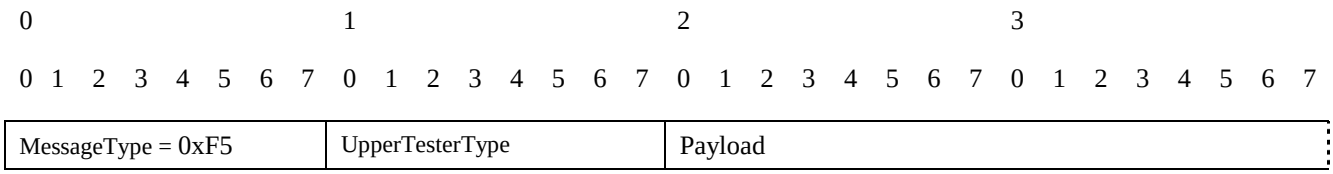
This message is sent by FNTP to confirm the creation of a new port/socket (see ISO 29281-1 [1], clause 8.2.2).



Name	Length	Value
MessageType	1 byte	0xF3
UpperTesterType	1 byte	0xFD if the vendor upper tester uses IICP protocol as described in ISO 24102-4 [i.4], 0xFE otherwise
Payload	Variable	Packet's final payload

B.3.1.4 FntpForwardTableNotification

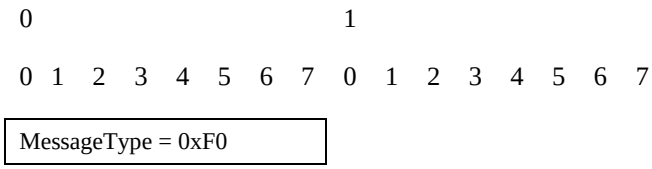
This message is sent FNTP to the ITS Management layer to notify it that a new port/socket was created (see ISO 24102-3 [i.3], clause E.2.3).



Name	Length	Value
MessageType	1 byte	0xF5
UpperTesterType	1 byte	0xFD if the vendor upper tester uses IICP protocol as described in ISO 24102-4 [i.4], 0xFE otherwise
Payload	Variable	Packet's final payload

B.3.2 FSAP Upper Tester Primitives - FsapInitialize

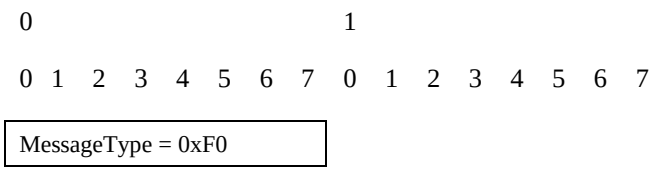
This message is used to request initialization of FSAP implementation.



Name	Length	Value
MessageType	1 byte	0xF0
Settings	3 bytes	

B.3.3 IICP Upper Tester Primitives - IicpInitialize

This message is used to request initialization of FSAP implementation.



Name	Length	Value
MessageType	1 byte	0xF0
Settings	3 bytes	

History

Document history		
V1.1.1	July 2012	Publication
V1.2.1	June 2014	Publication