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European Standard (Telecommunications series)

**Integrated Services Digital Network (ISDN);
Signalling System No.7;
Support of Virtual Private Network (VPN)
applications with Private network Q reference point
Signalling System number 1 (PSS1) information flows;
Part 3: Test Suite Structure and
Test Purposes (TSS&TP) specification**



Reference

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document is part 3 of a multi-part EN covering the Integrated Services Digital Network (ISDN); Signalling System No.7; Support of Virtual Private Network (VPN) applications with Private network Q reference point Signalling System number 1 (PSS1) information flows, as identified below:

- Part 1: "Protocol specification [ITU-T Recommendations Q.765.1 and Q.699.1, modified]";
- Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification";**
- Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) specification".

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1 Scope

The present document contains the validation (conformance) test specification for the application transport mechanism, support of VPN applications with PSS1 information flows defined in ITU-T Recommendation Q.765.1 [18]. The present document applies only to exchanges having implemented the ISUP v3 protocol specification for the Application Transport Mechanism and APM support of VPN applications for the exchange. It is applicable for validation testing of all types of exchanges as defined in the ISUP v3 protocol specification. The present document does not deal with compatibility testing.

EN 301 062-2 [1] presents the Protocol Implementation Conformance Statements (PICS) and the document EN 301 062-4 [2] presents the Protocol Implementation eXtra Information for Testing (PIXIT), Protocol Conformance Test Report (PCTR) and the ATS for the application transport mechanism, support of VPN applications with PSS1 information flows.

The supplier of an implementation that is claimed to conform to the reference specification for the Signalling System Number 7, Application Transport Mechanism, support of VPN applications with PSS1 information flows ITU-T Recommendation Q.765.1 [18] is required to complete a copy of the PICS proforma provided in annex A document EN 301 062-2 [1].

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETSI EN 301 062-2: "Integrated Services Digital Network (ISDN); Signalling System No.7; Support of Virtual Private Network (VPN) applications with Private network Q reference point Signalling System number 1 (PSS1) information flows; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- [2] ETSI EN 301 062-4: "Integrated Services Digital Network (ISDN); Signalling System No.7; Support of Virtual Private Network (VPN) applications with Private network Q reference point Signalling System number 1 (PSS1) information flows; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification".
- [3] ISO/IEC 9646-1 (1994): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 1: General concepts".
- [4] ISO/IEC 9646-3 (1998): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 3: The Tree and Tabular Combined Notation (TTCN)".
- [5] ISO/IEC 9646-7 (1995): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 7: Implementation Conformance Statements".
- [6] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".
- [7] ITU-T Recommendation Q.701 (1993): "Functional description of the message transfer part (MTP) of Signalling System No. 7".
- [8] ITU-T Recommendation Q.702 (1988): "Signalling data link".

- [9] ITU-T Recommendation Q.703 (1996): "Signalling link".
- [10] ITU-T Recommendation Q.704 (1996): "Signalling network functions and messages".
- [11] ITU-T Recommendation Q.705 (1993): "Signalling network structure".
- [12] ITU-T Recommendation Q.706 (1993): "Message transfer part signalling performance".
- [13] ITU-T Recommendation Q.707 (1988): "Testing and maintenance".
- [14] ITU-T Recommendation Q.762 (1997): "Signalling System No. 7; ISDN user part general functions of messages and signals".
- [15] ITU-T Recommendation Q.763 (1997): "Signalling System No. 7; ISDN user part formats and codes".
- [16] ITU-T Recommendation Q.764 (1997): "Signalling System No. 7; ISDN user part signalling procedures".
- [17] ITU-T Recommendation Q.765: "Signalling System No. 7; Application Transport Mechanism".
- [18] ITU-T Recommendation Q.765.1: "Signalling System No. 7; Application Transport Mechanism, support of VPN applications with PSS1 information flows".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

- terms defined in ISDN User Part (ISUP) reference specification ITU-T Recommendations Q.765.1 [18], Q.765 [17], Q.763 [15] and Q.764 [16];
- terms defined in ISO/IEC 9646-1 [3], ISO/IEC 9646-3 [4] and in ISO/IEC 9646-7 [5].

In particular, the following terms apply:

Abstract Test Case (ATC): complete and independent specification of the actions required to achieve a specific test purpose, defined at the level of abstraction of a particular Abstract Test Method, starting in a stable testing state and ending in a stable testing state (see ISO/IEC 9646-1 [3], subclause 3.3.3)

Abstract Test Method (ATM): description of how an IUT is to be tested, given at an appropriate level of abstraction to make the description independent of any particular realization of a Means of Testing, but with enough detail to enable abstract test cases to be specified for this method (see ISO/IEC 9646-1 [3], subclause 3.3.5)

Abstract Test Suite (ATS): test suite composed of abstract test cases (see ISO/IEC 9646-1 [3], subclause 3.3.6)

Implementation Under Test (IUT): implementation of one or more OSI protocols in an adjacent user/provider relationship, being part of a real open system which is to be studied by testing (see ISO/IEC 9646-1 [3], subclause 3.3.43)

ISDN number: number conforming to the numbering and structure specified in ITU-T Recommendation E.164 [6]

Means of Testing (MOT): combination of equipment and procedures that can perform the derivation, selection, parameterization and execution of test cases, in conformance with a reference standardized ATS, and can produce a conformance log (see ISO/IEC 9646-1 [3], subclause 3.3.54)

PICS proforma: document in the form of a questionnaire, which when completed for an implementation or system becomes the PICS

PIXIT proforma: document in the form of a questionnaire, which when completed for the IUT becomes the PIXIT

Point of Control and Observation (PCO): point within a testing environment where the occurrence of test events is to be controlled and observed, as defined in an Abstract Test Method (see ISO/IEC 9646-1 [3], subclause 3.3.64)

Pre-test condition: setting or state in the IUT which cannot be achieved by providing stimulus from the test environment

Protocol Implementation Conformance Statement (PICS): statement made by the supplier of a protocol claimed to conform to a given specification, stating which capabilities have been implemented (see ISO/IEC 9646-1 [3], subclause 3.3.39 and subclause 3.3.80)

Protocol Implementation eXtra Information for Testing (PIXIT): statement made by a supplier or implementor of an IUT (protocol) which contains or references all of the information related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT (see ISO/IEC 9646-1 [3], subclause 3.3.41 and subclause 3.3.81)

System Under Test (SUT): real open system in which the IUT resides (see ISO/IEC 9646-1 [3], subclause 3.3.103)

3.2 Abbreviations

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

ACM	Address Complete Message
ANM	ANswer Message
APM	Application transPort Mechansim protocol control
ASE	Application Service Entity
ATII	Application Transport Instruction Indicators
ATM	Abstract Test Method
ATS	Abstract Test Suite
CNID	Corporate Telecommunications Network Identifier
CON	CONnect
CPG	Call Progress messaGe
CPN	Calling Party Number
DLE	Destination Local Exchange
GPINX	Gateway PINX
IAM	Initial Address Message
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
IUT	Implementation Under Test
LAB	PCO for signalling link
LAC	PCO for signalling link
LT	Lower Tester
MNT	Maintenance PCO
MOT	Means Of Testing
MTP	Message Transfer Part
NNI	Network-Network Interface
OLE	Originating Local Exchange
PAN	Public Addressed Node
PCO	Point of Control and Observation
PICS	Protocol Implementation Conformance Statement
PIN	Public Initiating Node
PINX	Private Integrated Services Network Exchange
PIXIT	Protocol Implementation eXtra Information for Testing
PSS1	Private network Q reference point Signalling System number 1
SP	Signalling Point
SUT	System Under Test
TCP	Test Coordination Procedures
TP	Test Purpose (context dependent)
TPINX	Transit PINX
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation
UT	Upper Tester
VPN	Virtual Private Network

The ISUP message acronyms can be found in table 2 of ITU-T Recommendation Q.762 [14].

The APM primitives acronyms can be found in the different tables of ITU-T Recommendation Q.765 [17].

The VPN primitives acronyms can be found in the different tables of ITU-T Recommendation Q.765.1 [18].

3.2.1 ISUP abbreviations

The following abbreviations apply for ISUP parameters and parameter values.

AdSg	Address Signals
CdPN	called party number
CgPN	Calling Party Number
GenNb	generic number parameter
GenNot	Generic Notification
IUT	Implementation Under Test
LAB	PCO for signalling link
LT	Lower Tester
MNT	Maintenance PCO
PAN	Public Addressed Node
PCO	Point of Control and Observation
PIN	Public Initiating Node
TCP	Test Coordination Procedures
TMR	Transmission Medium Requirement
TPINX	Transit PIN
USI	User Service Indicator
UT	Upper Tester
UT	Upper Tester

4 Implementation under test and test methods

4.1 Identification of the system and implementation under test

The System Under Test (SUT) is an exchange. The Implementation Under Test (IUT) is the ISUP v3 implementation in this exchange, mainly the part responsible for the Application Transport Mechanism, support of VPN applications with PSS1 information flows, as shown in figure 1.

The protocol functions for the Application Transport Mechanism, support of VPN applications with PSS1 information flows' relates to the signalling associations with a bearer (ISUP). Therefore the defined ISUP Basic Call and its associated formats and codes are required to support the Application Transport Mechanism for VPN applications. The following main subjects have to be considered in this area:

- a) APM-user Protocol Control (APM-user Application Service Element);
- b) Application Transport Mechanism protocol control (APM Application Service Element);
- c) ISUP Basic Call (ISUP Application Service Element).

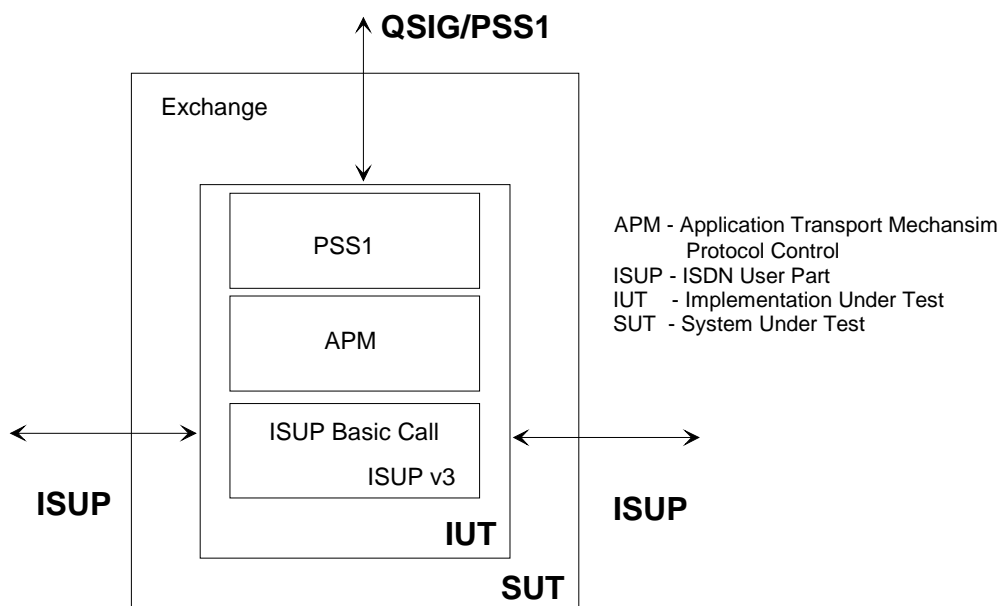


Figure 1: The System Under Test

The ISUP signalling protocol can be observed on the SS No.7 link on the Network-Network Interface (NNI).

4.2 ATM and testing configuration for ISUP v3 - APM support of VPN

The Abstract Test Method (ATM) chosen for the Application Transport Mechanism, support of VPN applications with PSS1 information flows' specification is the distributed multi-party test method. The ATM is defined at an appropriate level of abstraction so that the test cases may be specified appropriately, without adding restrictions to the implementation under test. The testing architectures are described in the following subclauses.

The ATS is written in concurrent TTCN.

4.3 Local exchanges

As mentioned above, the IUT can be tested within different configurations. The following text describes the test configuration for the IUT where the software for IUSP v3 and also the VPN part reside in a local exchange.

Figure 2 shows the logical test components of the adopted test configuration. The main test component is located on the right side of the IUT, it contains the ISUP part. On the left side there is a parallel test component which covers the VPN part.

To observe and control the message flow on the ISUP and VPN side for each side a Point of Control and Observation (PCO) is needed. The PCO for the ISUP link is abbreviated with an 'L' followed by two letters indicating the interface. The PCO for the PSS1 interface is abbreviated with an 'A' followed by two letters indicating the interface.

The LAB PCO is used by the Lower Tester (LT) to control and observe the ISUP on the signalling to the exchange.

The ACH PCO is used by the Upper Tester (UT) to control and observe the PSS1 signalling to the PIN.

The MNT PCO is used by the Upper Tester (UT) to control and observe the maintenance functions of the exchange.

This configuration to test the local exchanges is presented in figure 2.

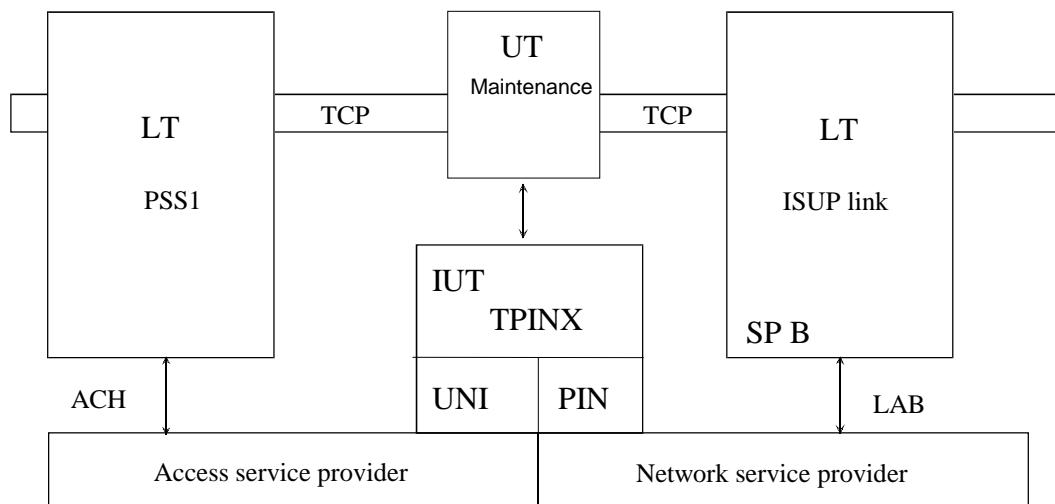


Figure 2: APM test configuration for local exchanges

4.4 Transit exchanges

The configuration proposed for testing transit exchanges is shown in figure 3. In order to test the protocol and functionality of transit, one needs to consider the incoming and outgoing side of the SUT.

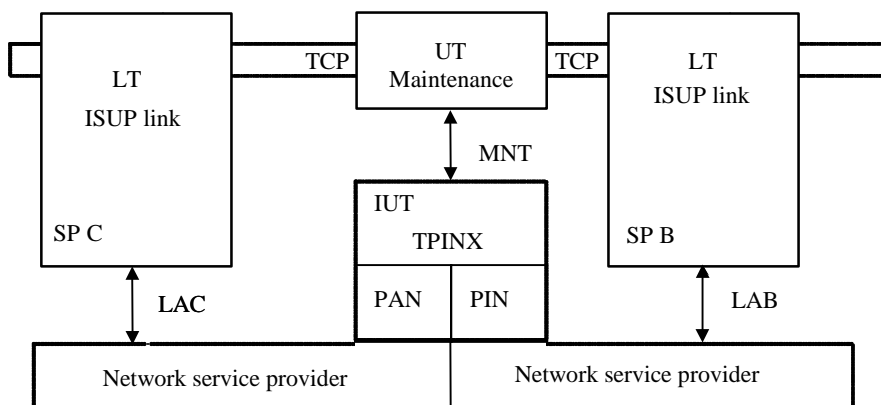


Figure 3: APM test configuration for transit exchanges

The IUT is observed and controlled from two ISUP links with associated circuits. The Points of Control and Observation (PCO) are labelled LAB on one side, LAC on the other.

The LAB and LAC PCOs are used by the Lower Testers for controlling the ISUP signalling link.

The MNT PCO is used by the Upper Tester to control and observe the maintenance functions of the exchange.

The Test Co-ordination Procedures (TCP) allow for communication between the testers. The test components are mostly implicitly co-ordinated (asynchronously); the TCPs are only used when it is necessary to obtain the verdict from the parallel test component.

The ISUP PDUs to be sent and observed on the LAB/LAC PCO's side allow for PDU constraints to be specified and coded down to the bit level.

The underlying network service provider is the Message Transfer Part (MTP) protocol as specified in ITU-T Recommendations Q.701 [7] to Q.707 [13].

4.4.1 Master-slave aspects in the test configuration

Figures 2 and 3 show the logical test components of the adopted test configuration. The main test component is located on the right side of the IUT and it contains the ISUP part.

In case testing the transit behaviour of the IUT, the parallel test component on the left side contains also the ISUP part.

As mentioned above, these test specification include tests for both, the IUT given as local and as a transit exchange (international and national). At test execution exactly one of these configurations will be chosen, based on the information provided in the PICS and PIXIT.

The message flow in the test cases is designed in such a way that the verdict is assigned based on observing the behaviour on the right side and/or left side, respectively. Both sides will in this case mainly act as a slave stimulus/acceptor. There are, however, test cases where the expected behaviour of both sides is needed to assign the verdict.

5 Test Suite Structure (TSS)

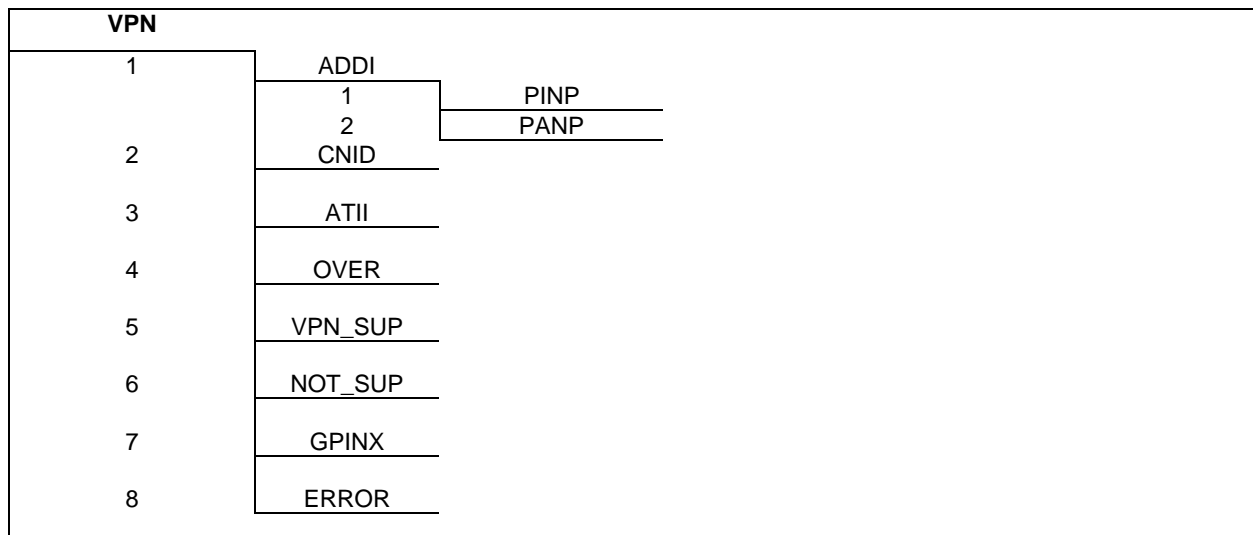


Figure 4: Test Suite Structure

Test Suite Structure (TSS) naming conventions are:

ADDI_PINP	Address Information PIN Procedures;
ADDI_PANP	Address Information PAN Procedures;
CNID	Corporate Telecommunications Network Identifier;
ATII	Application Transport Instruction Indicators;
OVER	Overlap sending;
VPN_SUP	VPN Supported;
NOT_SUP	VPN Not Supported;
GPINX	Gateway PINX;
ERROR	Error Handling;
V	Valid behaviour stimulus.

6 Test purposes (TP)

6.1 Introduction

For each test requirement a Test Purpose (TP) is defined.

6.2 Test purpose (TP) naming convention

Test Purposes are numbered ascending within each group. Groups are organized according to the TSS down to the last but one level. The classification in the V/I groups is done by the inclusion of V or I in the test case name. Additional qualifiers, in form of lower case letters, are added to identify variants within one generic test case, see table 2.

Table 2: TP Identifier naming convention scheme

Identifier:	=	VPN_<group>_<N>_<n>_{<n>}_{<a>}
VPN information flows	=	Virtual Private Network applications with PSS1
<group>	=	One character representing the test group: V: Valid stimulus I: Inopportune stimulus
<N>	=	Sequence number in the test suite structure
<n>	=	Sequence number used within the group
{<n>}	=	Optional additional number used
{<a>}	=	Optional lower-case character distinguishing tests with same reference number

6.2.1 Source of test purpose definition

The test purposes cover validation testing aspects and were developed within ETSI.

6.2.2 Test purpose structure

The test purpose structure overlaps with the Test Suite Structure (TSS).

Test purposes that test normal behaviour have been grouped in the **V** - valid behaviour group.

Test purposes that test the IUT behaviour in situations that are not normal operation have been grouped in the **I** - Inopportune stimulus group.

6.3 Test purposes for the Signalling System Number 7, APM support of Virtual Private Network applications with PSS1 information flows

All of the following test purposes belong to the main group ISUP_VPN. Each test purpose is presented in a separate table. The first row of the table contains the following items:

TSS	identifier in the test suite structure (test group/subgroup identifier);
TP	identifier of the test purpose;
Q.765.1 [18] reference	the reference to the requirement in the Signalling system number 7, application transport mechanism support of Virtual Private Network applications with PSS1 information flows [1], which led to the test purpose;
Selection expression	selection criterion for the test purpose taking into account the exchange's role and the answers to the specified PICS questions. If there is no selection expression specified, the TP is valid for all roles of exchanges;

Configuration this is a reference to the test configuration used.

The next row defines the test purpose itself, each having a *title* in *italics* and a text body.

In order to check the specified behaviour for some test purposes, a special prerequisite test condition has to be fulfilled. If such a condition is needed, it is presented after the test purpose under the heading 'Pre-test conditions'.

6.3.1 VPN ASE

The ISUP and PSS1 messages and parameters are highlighted in **bold** for readability.

TSS /ADDI_PINP/	TP VPN_V_1_1_1	Q.765.1 [18] reference 7.2.3.2.1/Q.765.1 [18]	Selection expression None	Configuration Local
Test purpose <i>Handling of called party number at PIN</i> To verify that the IUT can transfer the called party number (CdPN) sent in the PSS1 set-up message to the ISUP generic number parameter (GenNb) with the Number qualifier indicator coded "additional called party number" in the Initial Address Message (IAM). Pre-test conditions: None				

TSS /ADDI_PINP/	TP VPN_V_1_1_2	Q.765.1 [18] reference 7.2.3.2.1/Q.765.1 [18]	Selection expression None	Configuration Local
Test purpose <i>Handling of calling party number at PIN</i> To verify that the IUT can transfer the calling party number (CdPN) sent in the PSS1 set-up message to the ISUP generic number parameter (GenNb) with the Number qualifier indicator coded "additional calling party number" in the Initial Address Message (IAM). Pre-test conditions: None				

TSS /ADDI_PINP/	TP VPN_V_1_1_3	Q.765.1 [18] reference 7.2.3.2.1/Q.765.1 [18]	Selection expression None	Configuration Local
Test purpose <i>Handling of connected number and connected subaddress at PIN</i> To verify that the IUT can transfer the connected number and the connected subaddress received in the PSS1 Setup message to the ISUP generic number parameter (GenNb) with the Number qualifier indicator coded "additional called party number" in the Initial Address Message (IAM). Pre-test conditions: None				

TSS /ADDI_PANP/	TP VPN_V_1_2_1	Q.765.1 [18] reference 7.2.3.2.1/Q.765.1 [18]	Selection expression None	Configuration Terminating
Test purpose <i>Handling of calling party number and calling party subaddress at PAN</i> To verify that the IUT can transfer the calling party number (CPN) received in the PSS1 Setup message in conjunction with the Initial Address Message (IAM) and the calling party subaddress are transferred to the access signalling system. Pre-test conditions: None				

TSS /ADDI_PANP/	TP VPN_V_1_2_2	Q.765.1 [18] reference 7.2.3.2.1/Q.765.1 [18]	Selection expression None	Configuration Local
Test purpose <i>Handling of connected number at PAN</i> To verify that the IUT can transfer the connected number sent in the PSS1 Connect Message to the ISUP Connect (CON) or Answer (ANM) message in the corresponding primitive. Pre-test conditions: None				

TSS /ADDI_PANP/	TP VPN_V_1_2_3	Q.765.1 [18] reference 7.2.3.2.1/Q.765.1 [18]	Selection expression None	Configuration Local
<p>Test purpose <i>Handling of connected subaddress</i> To verify that the IUT can transfer the connected subaddress according to the basic call procedures. Pre-test conditions: None</p>				

TSS /CNID/	TP VPN_V_2_1	Q.765.1 [18] reference 7.2.3.2.2/Q.765.1 [18]	Selection expression PICS A.2/5	Configuration Local
<p>Test purpose <i>Handling of Corporate Telecommunications Network Identifier (CNID)</i> To verify that if the IUT receives a Corporate Telecommunications Network Identifier (CNID) that it is sent in the Initial Address Message (IAM). Pre-test conditions: None</p>				

TSS /CNID/	TP VPN_V_2_2	Q.765.1 [18] reference 7.2.3.2.2/Q.765.1 [18]	Selection expression PICS A.2/5	Configuration Local
<p>Test purpose <i>Handling of unrecognized Corporate Telecommunications Network Identifier (CNID)</i> To verify that if the IUT receives a Corporate Telecommunications Network Identifier (CNID) that is not recognized by the PAN then the call is released with cause 63 and management function notified. Pre-test conditions: None</p>				

TSS /ATII/	TP VPN_V_3_1	Q.765.1 [18] reference 7.2.3.2.3/Q.765.1 [18]	Selection expression None	Configuration Local
<p>Test purpose <i>Handling of Application Transport Instruction Indicators (ATII) essential functionality</i> To verify that the IUT can include the Application Transport Instruction Indicators (ATII) in the PSS1 messages for essential functionality, then the ATII is set to release the call. Pre-test conditions: None</p>				

TSS /ATII/	TP VPN_V_3_2	Q.765.1 [18] reference 7.2.3.2.3/Q.765.1 [18]	Selection expression None	Configuration Local
<p>Test purpose <i>Handling of Application Transport Instruction Indicators (ATII) non essential functionality</i> To verify that the IUT can include the Application Transport Instruction Indicators (ATII) in the PSS1 messages for non essential functionality, then the ATII is set to continue the call and a notification requested. Pre-test conditions: None</p>				

TSS /OVER/	TP VPN_V_4_1	Q.765.1 [18] reference 7.2.3.2.4/Q.765.1 [18]	Selection expression None	Configuration Local
<p>Test purpose <i>Overlap sending - Procedures at the PAN</i> To verify that the IUT will send in the first backwards ISUP message (ACM or APM) on reception of the PSS1 Setup Acknowledge (PC_More_Information.Request primitive), the AP will send a PSS1 Setup Acknowledge (PSS1_Data.request primitive). Pre-test conditions: None</p>				

TSS /OVER/	TP VPN_V_4_2	Q.765.1 [18] reference 7.2.3.2.4/Q.765.1 [18]	Selection expression None	Configuration Local
<p>Test purpose <i>Overlap sending - Procedures at the PIN</i> To verify that the IUT, on reception of the PSS1 message Setup Acknowledge (PSS1_Data.Indication primitive), will send the remainder of the private called party number in the called party number parameter of the PSS1 Information Message (PSS1_Data.request primitives) in one or more ISUP APM messages. Pre-test conditions: None</p>				

TSS /VPN_SUP/	TP VPN_V_5_1	Q.765.1 [18] reference 7.2.3.2.5/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PAN</i> To verify that the IUT, on reception of the APP parameter with Application Context Identifier coded 'PSS1 ASE (VPN)' in the Initial Address Message (IAM) then the PAN shall include in the first backwards message the 'Call with VPN feature transparency capability'(VTI) indication in an APP parameter. Pre-test conditions: None</p>				

TSS /VPN_SUP/	TP VPN_V_5_2	Q.765.1 [18] reference 7.2.3.2.5/Q.765.1 [18]	Selection expression None	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN</i> To verify that the IUT, prior to the reception of the 'Call with VPN feature transparency capability (VTI)' indication at the PIN in an ACM, CPG, CON, ANM, PRI or APM message then the PIN shall not send any APP parameters. Pre-test conditions: None</p>				

TSS /VPN_SUP/	TP VPN_V_5_3	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN invocation of Gateway PINX</i> To verify that the IUT can invoke the Gateway PINX functionality if an ISUP Confusion message (CFN) with cause parameter non-existent or not implemented, discarded (99) with diagnostics indicating the APP. Pre-test conditions: Option to continue call.</p>				

TSS /VPN_SUP/	TP VPN_V_5_4	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN invocation of Gateway PINX</i> To verify that the IUT can invoke the Gateway PINX functionality on reception of an ACM, CON, ANM, CPG, APM or PRI message containing the APP parameter with Application Context Identifier field coded 'Unidentified Context and Error Handling (UCEH) ASE' and with the Application Transport Notification information coded 'PSS1 ASE (VPN)'(APM-user Context Identifier field) and 'unidentified context' (Reason field) from the PAN. Pre-test conditions: Option to continue call.</p>				

TSS /VPN_SUP/	TP VPN_V_5_5	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN invocation of Gateway PINX</i> To verify that the IUT can invoke the Gateway PINX functionality after the reception of an ISUP Connect Message (CON) without any APP parameter coded 'PSS1 ASE (VPN)' (ACI field) and previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call.</p>				

TSS /VPN_SUP/	TP VPN_V_5_6	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN invocation of Gateway PINX</i> To verify that the IUT can invoke the Gateway PINX functionality after the reception of an Answer Message (ANM) without any APP parameter coded 'PSS1 ASE (VPN)' (ACI field) and previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call.</p>				
TSS /VPN_SUP/	TP VPN_V_5_7	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN invocation of Gateway PINX</i> To verify that the IUT can invoke the Gateway PINX functionality after the reception of an Address Complete Message (ACM) indicating 'subscriber free' and a previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call.</p>				
TSS /VPN_SUP/	TP VPN_V_5_8	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN invocation of Gateway PINX</i> To verify that the IUT can invoke the Gateway PINX functionality after the reception of a Call Progress Message (CPG) indicating 'alerting' and a previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call.</p>				
TSS /NOT_SUP/	TP VPN_V_6_1	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS XXXX	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN release of call</i> To verify that the IUT releases the call with cause 63 (service or option not available - unspecified) if an ISUP Confusion Message (CFN) with cause parameter non-existent or not implemented, discarded (99) with diagnostics indicating the APP. Pre-test conditions: Option to continue call not supported. NOTE: An implementation dependent notification of the management function should occur.</p>				
TSS /NOT_SUP/	TP VPN_V_6_2	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN release of call</i> To verify that the IUT releases the call with cause 63 (service or option not available - unspecified) on reception of an ACM, CON, ANM, CPG, APM or PRI message containing the APP parameter with Application Context Identifier field coded 'Unidentified Context and Error Handling (UCEH) ASE' and with the Application Transport Notification information coded 'PSS1 ASE (VPN)' (APM-user Context Identifier field) and 'unidentified context' (Reason field) from the PAN. Pre-test conditions: Option to continue call not supported. NOTE: An implementation dependent notification of the management function should occur.</p>				
TSS /NOT_SUP/	TP VPN_V_6_3	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN release of call</i> To verify that the IUT releases the call with cause 63 (service or option not available - unspecified) after the reception of a Connect Message (CON) without any APP parameter coded 'PSS1 ASE (VPN)' (ACI field) and previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call not supported. NOTE: An implementation dependent notification of the management function should occur.</p>				

TSS /NOT_SUP/	TP VPN_V_6_4	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN release of call</i> To verify that the IUT releases the call with cause 63 (service or option not available - unspecified) after the reception of an Answer Message (ANM) without any APP parameter coded 'PSS1 ASE (VPN)' (ACI field) and previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call not supported.</p>				
NOTE: An implementation dependent notification of the management function should occur.				

TSS /NOT_SUP/	TP VPN_V_6_5	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN release of call</i> To verify that the IUT releases the call with cause 63 (service or option not available - unspecified) after the reception of an Address Complete Message (ACM) indicating 'subscriber free' and a previous message without 'call with VPN feature transparency capability'. Pre-test conditions: Option to continue call not supported.</p>				
NOTE: An implementation dependent notification of the management function should occur.				

TSS /NOT_SUP/	TP VPN_V_6_6	Q.765.1 [18] reference 7.2.3.2.5 6.2.6/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose <i>APM/VPN not supported - Procedures at the PIN release of call</i> To verify that the IUT releases the call with cause 63 (service or option not available - unspecified) after the reception of a Call Progress Message (CPG) indicating 'alerting' and a previous message without 'call with VPN feature transparency capability'. (Note: an implementation dependent notification of the management function should occur). Pre-test conditions: Option to continue call not supported.</p>				

TSS /GPINX/	TP VPN_V_7_1	Q.765.1 [18] reference 7.2.3.2.6/Q.765.1 [18]	Selection expression PICS A.2/4	Configuration OLE
<p>Test purpose <i>Gateway PINX transformation at Originating PINX</i> To verify that the IUT which can transform from an Originating PINX into a Gateway PINX indicates 'PINX with gateway transformation capability' in the forward direction in the initial set-up message. Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_2	Q.765.1 [18] reference 7.2.3.2.6/Q.765.1 [18]	Selection expression PICS A.2/4	Configuration Transit
<p>Test purpose <i>Gateway PINX transformation at Transit PINX</i> To verify that the IUT which can transform from a Transit PINX into a Gateway PINX indicates 'PINX with gateway transformation capability' in the forward direction in the initial set-up message. Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_3	Q.765.1 [18] reference 7.2.3.2.6/Q.765.1 [18]	Selection expression PICS A.2/4	Configuration Transit
<p>Test purpose <i>Outgoing Gateway PINX transformation</i> To verify that the IUT, on receiving a 'Gateway PINX transformation request' indication in an ACM, CPG, CON, ANM, PRI or APM message, shall check if a previous node has gateway PINX functionality and if not shall transform itself to behave as an Outgoing Gateway PINX and send in the backward direction 'Call with VPN feature transparency capability (VTI)' indication if not already sent. Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_4	Q.765.1 [18] reference 7.2.3.2.6/Q.765.1 [18]	Selection expression PICS A.2/4	Configuration Transit
<p>Test purpose <i>Passing of Gateway PINX transformation request</i> To verify that the IUT, on receiving a 'Gateway PINX transformation request' indication in an ACM, CPG, CON, ANM, PRI or APM message, shall check if a previous node has gateway PINX functionality and if one exists then pass the request unchanged. Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_5	Q.765.1 [18] reference 7.2.3.2.6/Q.765.1 [18]	Selection expression PICS A.2/4	Configuration DLE
<p>Test purpose <i>Sending of Gateway PINX transformation request</i> To verify that the IUT with PINX functionality that determines that Gateway PINX functionality is required shall send in the backwards direction a 'Gateway PINX transformation request' and send the 'VPN feature transparency capability (VTI)' indication set to 'no indication'. Pre-test conditions: Node with PINX functionality.</p>				

TSS /ERROR/	TP VPN_V_8_1	Q.765.1 [18] reference 7.2.5/Q.765.1 [18]	Selection expression PICS A.2/4	Configuration DLE
<p>Test purpose <i>Error indication primitive reception of 'unidentified context' call continued</i> To verify that the IUT, with the option to continue calls with no application association, on reception of a PSS1 Status Message (PSS1_Error primitive) containing an error notification indicating 'unidentified context', then the node shall invoke gateway PINX functionality and continue the call. Pre-test conditions: Node with option to continue.</p>				

TSS /ERROR/	TP VPN_V_8_2	Q.765.1 [18] reference 7.2.5/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration DLE
<p>Test purpose <i>Error indication primitive reception of 'unidentified context' call released</i> To verify that the IUT, without the option to continue calls, on reception of a PSS1 Release Message (PSS1_Error primitive) containing an error notification indicating 'unidentified context', then the node shall release the call (Note: an implementation dependent notification of the management function should occur). Pre-test conditions: Node with option to continue not supported.</p>				

TSS /ERROR/	TP VPN_V_8_3	Q.765.1 [18] reference 7.2.5/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration DLE
<p>Test purpose <i>Error indication primitive reception of 'reassembly error'</i> To verify that the IUT on reception of a PSS1 Status Message (PSS1_Error primitive) containing an error notification indicating 'reassembly error' shall notify the management function. (Note: an implementation dependent notification of the management function should occur). Pre-test conditions: None.</p>				

TSS /ERROR/	TP VPN_V_8_4	Q.765.1 [18] reference 7.2.5/Q.765.1 [18]	Selection expression PICS A.2/3	Configuration DLE
<p>Test purpose <i>Error indication primitive reception of 'unrecognized mandatory information'</i> To verify that the IUT on reception of a PSS1 Release Message (PSS1_Error primitive) containing an error notification indicating 'unrecognized mandatory information', the call shall be released with cause code 111- Protocol error, unspecified. Pre-test conditions: None.</p>				

7 Test Coverage

The test purposes defined in this test specification cover the bearer related capabilities of the VPN Application Process functions of ITU-T Recommendation Q.765.1 [18].

A list containing the number of test purposes for the related requirements of the standard/ITU-T Recommendation Q.765.1 [18] is provided in table 3.

Whenever it was possible, the test purposes have been described such that they bundle related requirements of the standard. Due to this fact a test purpose may lead to implementing several test cases for the ATS.

The test purposes concentrate on valid behaviour. This means that there is no invalid behaviour test purposes specified. An expansion of the invalid behaviour test purposes is left for further study along with bearer unrelated VPN Application Process functions.

Table 3: Number of tests for the Virtual Private Network (VPN)

Item	VPN procedures	Group	Number of test purposes
VPN ASE			
1	Address Information PIN Procedures	ADDI_PINP	3
2	Address Information PAN Procedures	ADDI_PANP	3
3	Corporate Telecommunications Network Identifier (CNID)	CNID	2
4	Application Transport Instruction Indicators (ATII)	ATII	2
5	Overlap sending	OVER	2
6	VPN Supported	VPN_SUP	8
7	VPN Not Supported	NOT_SUP	6
8	Gateway PINX	GPINX	5
9	Error Handling	ERROR	4
Grand total			35

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

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

ISO/IEC 9646-5 (1994): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 5: Requirements on test laboratories and clients for the conformance assessment process".

ITU-T Recommendation Q.784.2 (1997): "ISUP basic call test specification: Abstract test suite for ISUP'92 basic call control procedures".

ETSI EN 301 062-1 (V1.2): Integrated Services Digital Network (ISDN); Signalling System No.7; Support of Virtual Private Network (VPN) applications with Private network Q reference point Signalling System number 1 (PSS1) information flows; Part 1: Protocol specification [ITU-T Recommendations Q.765.1 and Q.699.1, modified].

History

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