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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – ISDN user part

Abstract test suite for the APM support of VPN applications

ITU-T Recommendation Q.765.1 *bis*

(Previously CCITT Recommendation)

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For further details, please refer to ITU-T List of Recommendations.

ABSTRACT TEST SUITE FOR THE APM SUPPORT OF VPN APPLICATIONS

Summary

This Recommendation contains the conformance test specification for ISUP'97 APM support of VPN (Virtual Private Network). The main body of this Recommendation presents the test suite structure and test purposes. The annexes present the protocol implementation conformance statements (PICS), the protocol implementation extra information for testing (PIXIT), protocol conformance test report (PCTR) and the ATS for APM support for VPN applications, the latter being available on electronic media only.

Source

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FOREWORD

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Recommendation Q.765.1 bis

ABSTRACT TEST SUITE FOR THE APM SUPPORT OF VPN APPLICATIONS

1 Scope

This Recommendation contains the validation (conformance) test specification for the Application Transport Mechanism, support of VPN applications with PSS1 information flows defined in Recommendation Q.765.1 [1]. This Recommendation applies only to exchanges having implemented the ISUP'97 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'97 protocol specification. This Recommendation does not deal with compatibility testing.

The main text part of this Recommendation presents the requirements regarding the chosen test method, conventions used within the ATS, the Test Suite Structure and Test Purposes (TSS & TP) for the Application Transport Mechanism, support of VPN applications with PSS1 information flows.

The annexes present the Protocol Implementation Conformance Statements (PICS), 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 last one being available on electronic media.

Annex A provides the Protocol Implementation Conformance Statement (PICS) proforma for the Application Transport Mechanism, support of VPN applications with PSS1 information flows defined in compliance with the relevant requirements and in accordance with the guidance given in ISO/IEC 9646-7 [9]. This statement indicates which capabilities and options of a telecommunication specification have been implemented. It is necessary for evaluating the conformance of a particular implementation.

The supplier of an implementation that is claimed to comply with to the reference specification for the Signalling System No. 7, Application Transport Mechanism, support of VPN applications with PSS1 information flows [1] is required to complete a copy of the PICS proforma provided in Annex A.

Annex B provides the protocol implementation extra information for test (PIXIT) proforma needed as a preparation for testing.

Annex C provides the protocol conformance test report (PCTR) proforma used for evaluating the results of the testing campaign.

Annex D explains how to get hold of the actual ATS, which is delivered in electronic form only.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Recommendation Q.765.1 (1998), *Signalling System No. 7 – Application transport mechanism: Support of VPN applications with PSS1 information flows.*

- [2] ITU-T Recommendation Q.765 (1998), *Signalling System No. 7 – Application transport mechanism*.
- [3] ITU-T Recommendation Q.763 (1997), *Signalling System No. 7 – ISDN User Part formats and codes*.
- [4] ITU-T Recommendation Q.764 (1997), *Signalling System No. 7 – ISDN User Part signalling procedures*.
- [5] ISO/IEC 9646-1:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts*.
- [6] ISO/IEC 9646-2:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract Test Suite specification*.
- [7] ISO/IEC 9646-3:1998, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 3: The Tree and Tabular Combined Notation (TTCN)*.
- [8] 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*.
- [9] ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements*.
- [10] ITU-T Recommendation Q.784.2 (1997), *ISUP basic call test specification: Abstract test suite for ISUP'92 basic call control procedures*.
- [11] CCITT Recommendation E.164 (1988), *Numbering plan for the ISDN era*.

3 Definitions

For the purposes of the ATS specification, the following definitions apply:

- terms defined in ISDN User Part (ISUP) reference specification [1] to [4];
- terms defined in ISO/IEC 9646-1 [5], ISO/IEC 9646-3 [7] and in ISO/IEC 9646-7 [9].

In particular, the following terms apply:

3.1 Abstract Test Case (ATC): A 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 [5], § 3.3.3).

3.2 Abstract Test Method (ATM): The 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 [5], § 3.3.5).

3.3 Abstract Test Suite (ATS): A test suite composed of abstract test cases (see [5], § 3.3.6).

3.4 Implementation Under Test (IUT): An 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 [5], § 3.3.43).

3.5 ISDN number: A number conforming to the numbering and structure specified in CCITT Recommendation E.164 [11].

3.6 Means of Testing (MOT): The 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 [5], § 3.3.54).

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

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

3.9 point of control and observation: A 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 [5], § 3.3.64).

3.10 pre-test condition: A setting or state in the IUT which cannot be achieved by providing stimulus from the test environment.

3.11 Protocol Implementation Conformance Statement (PICS): A statement made by the supplier of a protocol claimed to conform to a given specification, stating which capabilities have been implemented (see [5], § 3.3.39 and § 3.3.80).

3.12 Protocol Implementation eXtra Information for Testing (PIXIT): A 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 [5], § 3.3.41 and § 3.3.81).

3.13 System Under Test (SUT): The real open system in which the IUT resides (see [5], § 3.3.103).

4 Abbreviations

This Recommendation uses the following abbreviations:

APM	Application Transport Mechanism
ASE	Application Service Entity
ASP	Abstract Service Primitive
ATM	Abstract Test Method
ATS	Abstract Test Suite
CCBS	Completion of Calls to Busy Subscriber
CD	Call Deflection
CDIV	Call DIVersion
DLE	Destination Local Exchange
ECT	Explicit Call Transfer
GPINX	Gateway PINX
ICS	Implementation Conformance Statement
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
IUT	Implementation Under Test
LT	Lower Tester
MCID	Malicious Call Identification

MOT	Means Of Testing
MTC	Main Test Component
MTP	Message Transfer Part
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 No. 1
PTC	Parallel Test Component
SP	Signalling Point
SUT	System Under Test
TCP	Test Coordination Procedures
TP	Test Purpose (context dependent)
TPINX	Transit PINX
TSS	Test Suite Structure
TSS & TP	Test Suite Structure and Test Purposes
TTCN	Tree and Tabular Combined Notation
UT	Upper Tester
VPN	Virtual Private Network

The ISUP message acronyms can be found in Table 2/Q.762.

The APM primitives acronyms can be found in the different tables of Recommendation Q.765 [2].

The VPN primitives acronyms can be found in the different tables of Recommendation Q.765.1 [1].

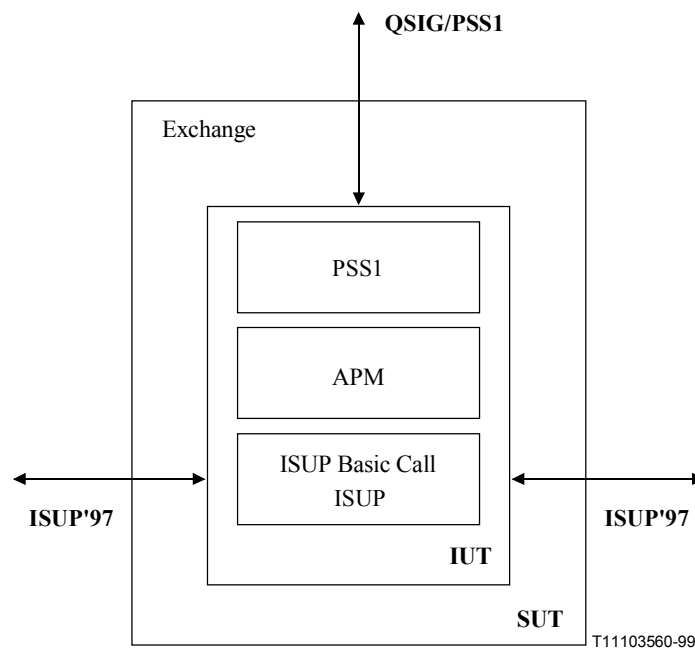
The following abbreviations apply for ISUP parameters and parameter values.

AdSg	Address Signals
CgPN	Calling Party Number
GenNot	Generic Notification
TMR	Transmission Medium Requirement
USI	User Service Indicator

5 Implementation under test and test methods

5.1 Identification of the system and implementation under test

The System Under Test (SUT) is an exchange. The Implementation Under Test (IUT) is the ISUP'97 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.



APM Application Transport Mechanism
 ISUP ISDN User Part
 IUT Implementation Under Test
 SUT System Under Test

Figure 1/Q.765.1 bis – The system under test

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).

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

5.2 ATM and testing configuration for ISUP'97 – APM support of VPN

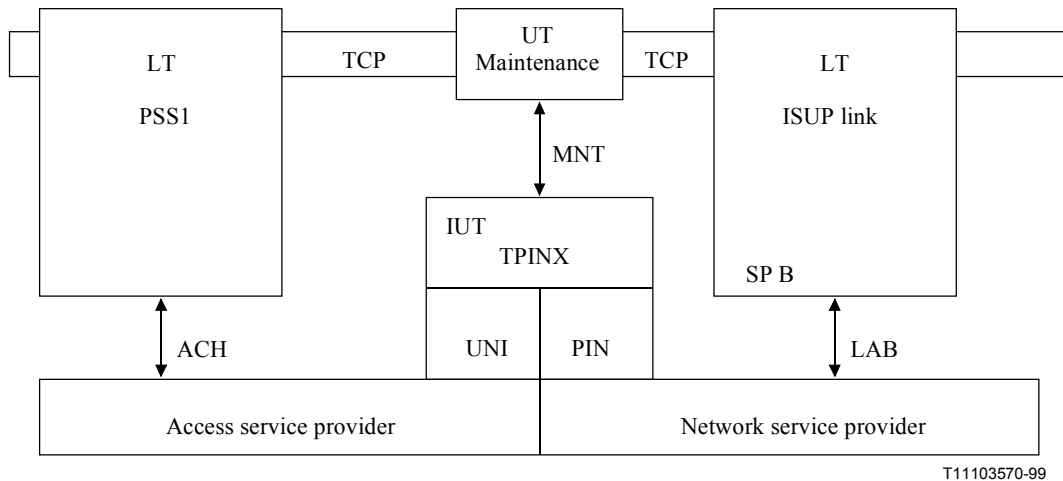
The Abstract Test Method (ATM) chosen for the Application Transport Mechanism, support of VPN applications with PSS1 information flows specification is the distributed multi-party test method. The ATM is defined at an appropriate level of abstraction so that the test cases may be specified appropriately,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

The ATS is written in concurrent TTCN.

5.3 Local exchanges

As mentioned above, IUT can be tested within different configurations. The following text describes the test configuration for IUT where the software for ISUP'97 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 IUT; it contains the ISUP part. On the left side there is a parallel test component which covers the VPN part.



ACH	Access call handling PCO (PSS1)	PCO	Point of Control and Observation
IUT	Implementation Under Test	PIN	Public Initiating Node
LAB	PCO for signalling link	TCP	Test Coordination Procedures
LT	Lower Tester	TPINX	Transit PINX
MNT	Maintenance PCO	UNI	User-Network Interface
		UT	Upper Tester

Figure 2/Q.765.1 bis – APM test configuration for local exchanges

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.

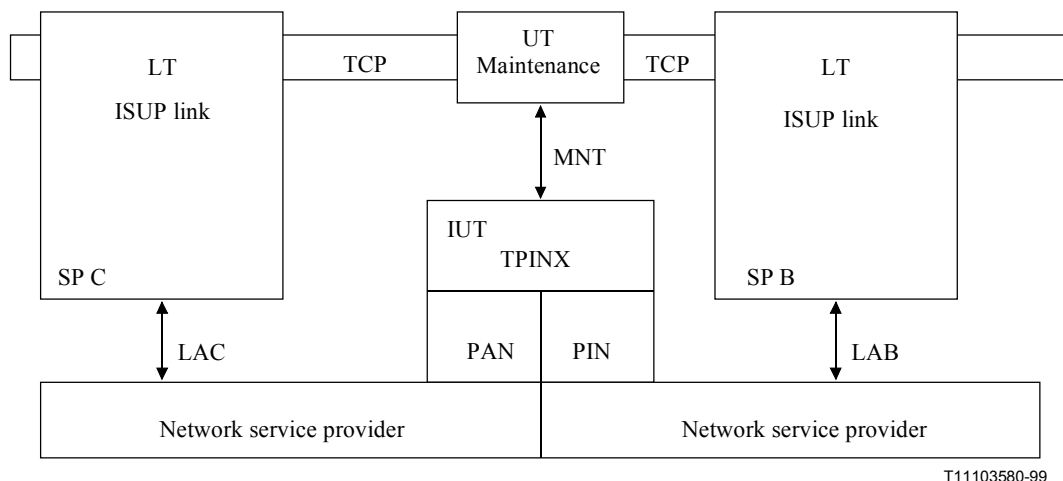
The ACH PCO is used by the lower tester (LT) to control and observe the PSS1 signalling to the PIN.

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.

5.4 Transit exchanges

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



IUT	Implementation Under Test	PCO	Point of Control and Observation
LAB	PCO for signalling link	PIN	Public Initiating Node
LAC	PCO for signalling link	SP	Signalling Point
LT	Lower Tester	TCP	Test Coordination Procedures
MNT	Maintenance PCO	TPINX	Transit PINX
PAN	Public Addressed Node	UT	Upper Tester

Figure 3/Q.765.1 bis – 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 the one side, LAC on the other.

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

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

The Test Coordination Procedures (TCP) allow for communication between the testers. The test components are mostly implicitly coordinated (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 PCOs 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 Recommendations Q.701 to Q.707.

5.4.1 Master-slave aspects in the test configuration

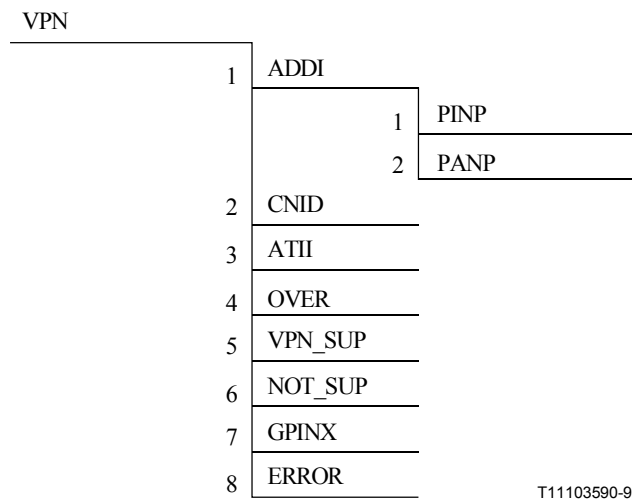
Figures 2 and 3 show the logical test components of the adopted test configuration. The main test component is located on the right side of the IUT and it contains the ISUP part.

In the case of 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 specifications 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.

6 Test Suite Structure (TSS)



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Figure 4/Q.765.1 bis – 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 (CNID)
ATII	Application Transport Instruction Indicators (ATII)
OVER	Overlap sending
VPN_SUP	VPN Supported
NOT_SUP	VPN Not Supported
GPINX	Gateway PINX
ERROR	Error Handling
V	Valid behaviour stimulus

7 Test Purposes (TP)

7.1 Introduction

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

7.2 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 the form of lower case letters, are added to identify variants within one generic test case (see Table 1).

Table 1/Q.765.1 bis – TP Identifier naming convention scheme

Identifier:	VPN_<group>_<N>_<n>_{<n>}_{<a>}
VPN	= Virtual Private Network applications with PSS1 information flows
<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

7.2.1 Source of test purpose definition

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

7.2.2 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.

7.3 Test purposes for the Signalling System No. 7, APM support of Virtual Private Network applications with PSS1 information flows

All of the following test purposes belong to the main group ISUP_97_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 reference	The reference to the requirement in the Signalling System No. 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 (see Annex A). 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".

7.3.1 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 reference 7.2.3.2.1/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>Handling of called party number at PIN</i></p> <p>To verify that the IUT can transfer the called party number (CdPN) sent 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).</p> <p>Pre-test conditions: None</p>				

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

TSS /ADDI_PINP/	TP VPN_V_1_1_3	Q.765.1 reference 7.2.3.2.1/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>Handling of connected number and connected subaddress at PIN</i></p> <p>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).</p> <p>Pre-test conditions: None</p>				

TSS /ADDI_PANP/	TP VPN_V_1_2_1	Q.765.1 reference 7.2.3.2.1/Q.765.1	Selection expression None	Configuration Terminating
<p>Test purpose</p> <p><i>Handling of calling party number and calling party subaddress at PAN</i></p> <p>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.</p> <p>Pre-test conditions: None</p>				

TSS /ADDI_PANP/	TP VPN_V_1_2_2	Q.765.1 reference 7.2.3.2.1/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>Handling of connected number at PAN</i></p> <p>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.</p> <p>Pre-test conditions: None</p>				

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

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

TSS /CNID/	TP VPN_V_2_2	Q.765.1 reference 7.2.3.2.2/Q.765.1	Selection expression PICS A.2/5	Configuration Local
<p>Test purpose</p> <p><i>Handling of unrecognized Corporate Telecommunications Network Identifier (CNID)</i></p> <p>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.</p> <p>Pre-test conditions: None</p>				

TSS /ATII/	TP VPN_V_3_1	Q.765.1 reference 7.2.3.2.3/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>Handling of Application Transport Instruction Indicators (ATII) essential functionality</i></p> <p>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.</p> <p>Pre-test conditions: None</p>				

TSS /ATII/	TP VPN_V_3_2	Q.765.1 reference 7.2.3.2.3/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>Handling of Application Transport Instruction Indicators (ATII) non-essential functionality</i></p> <p>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.</p> <p>Pre-test conditions: None</p>				

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

TSS /OVER/	TP VPN_V_4_2	Q.765.1 reference 7.2.3.2.4/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>Overlap sending – Procedures at the PIN</i></p> <p>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.</p> <p>Pre-test conditions: None</p>				

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

TSS /VPN_SUP/	TP VPN_V_5_2	Q.765.1 reference 7.2.3.2.5/Q.765.1	Selection expression None	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN</i></p> <p>To verify that the IUT, prior to the reception of a backwards message (ACM, CPG, CON, ANM, PRI or APM) including the APP parameter with the Corporate Telecommunications Network Identifier VTI field indicating 'Call with VPN feature transparency capability', shall not send any APP parameters except for the initial capability request sent in the IAM.</p> <p>Pre-test conditions: None</p>				

TSS /VPN_SUP/	TP VPN_V_5_3	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN invocation of Gateway PINX</i></p> <p>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 (cause #99) with diagnostics indicating the APP.</p> <p>Pre-test conditions: Option to continue call.</p>				

TSS /VPN_SUP/	TP VPN_V_5_4	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN invocation of Gateway PINX</i></p> <p>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.</p> <p>Pre-test conditions: Option to continue call.</p>				

TSS /VPN_SUP/	TP VPN_V_5_5	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN invocation of Gateway PINX</i></p> <p>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'.</p> <p>Pre-test conditions: Option to continue call.</p>				
TSS /VPN_SUP/	TP VPN_V_5_6	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN invocation of Gateway PINX</i></p> <p>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'.</p> <p>Pre-test conditions: Option to continue call.</p>				
TSS /VPN_SUP/	TP VPN_V_5_7	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN invocation of Gateway PINX</i></p> <p>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'.</p> <p>Pre-test conditions: Option to continue call.</p>				
TSS /VPN_SUP/	TP VPN_V_5_8	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/2	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN invocation of Gateway PINX</i></p> <p>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'.</p> <p>Pre-test conditions: Option to continue call.</p>				
TSS /NOT_SUP/	TP VPN_V_6_1	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS XXXX	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN release of call</i></p> <p>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 (cause #99) with diagnostics indicating the APP. (Note: An implementation-dependent notification of the management function should occur.)</p> <p>Pre-test conditions: Option to continue call not supported.</p>				

TSS /NOT_SUP/	TP VPN_V_6_2	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN release of call</i></p> <p>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. (Note: An implementation-dependent notification of the management function should occur.)</p> <p>Pre-test conditions: Option to continue call not supported.</p>				

TSS /NOT_SUP/	TP VPN_V_6_3	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN release of call</i></p> <p>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 a previous message without 'call with VPN feature transparency capability'. (Note: An implementation-dependent notification of the management function should occur.)</p> <p>Pre-test conditions: Option to continue call not supported.</p>				

TSS /NOT_SUP/	TP VPN_V_6_4	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN release of call</i></p> <p>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 a previous message without 'call with VPN feature transparency capability'. (Note: An implementation-dependent notification of the management function should occur.)</p> <p>Pre-test conditions: Option to continue call not supported.</p>				

TSS /NOT_SUP/	TP VPN_V_6_5	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN release of call</i></p> <p>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'. (Note: An implementation-dependent notification of the management function should occur.)</p> <p>Pre-test conditions: Option to continue call not supported.</p>				

TSS /NOT_SUP/	TP VPN_V_6_6	Q.765.1 reference 7.2.3.2.5/Q.765.1 6.2.6/Q.765.1	Selection expression PICS A.2/3	Configuration Local
<p>Test purpose</p> <p><i>APM/VPN not supported – Procedures at the PIN release of call</i></p> <p>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.)</p> <p>Pre-test conditions: Option to continue call not supported.</p>				

TSS /GPINX/	TP VPN_V_7_1	Q.765.1 reference 7.2.3.2.6/Q.765.1	Selection expression PICS A.2/4	Configuration OLE
<p>Test purpose</p> <p><i>Gateway PINX transformation at Originating PINX</i></p> <p>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 setup message.</p> <p>Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_2	Q.765.1 reference 7.2.3.2.6/Q.765.1	Selection expression PICS A.2/4	Configuration Transit
<p>Test purpose</p> <p><i>Gateway PINX transformation at Transit PINX</i></p> <p>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 setup message.</p> <p>Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_3	Q.765.1 reference 7.2.3.2.6/Q.765.1	Selection expression PICS A.2/4	Configuration Transit
<p>Test purpose</p> <p><i>Outgoing Gateway PINX transformation</i></p> <p>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.</p> <p>Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_4	Q.765.1 reference 7.2.3.2.6/Q.765.1	Selection expression PICS A.2/4	Configuration Transit
<p>Test purpose</p> <p><i>Passing of Gateway PINX transformation request</i></p> <p>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.</p> <p>Pre-test conditions: Node with Gateway PINX functionality.</p>				

TSS /GPINX/	TP VPN_V_7_5	Q.765.1 reference 7.2.3.2.6/Q.765.1	Selection expression PICS A.2/4	Configuration DLE
<p>Test purpose</p> <p><i>Sending of Gateway PINX transformation request</i></p> <p>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'.</p> <p>Pre-test conditions: Node with PINX functionality.</p>				

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

TSS /ERROR/	TP VPN_V_8_2	Q.765.1 reference 7.2.5/Q.765.1	Selection expression PICS A.2/3	Configuration DLE
<p>Test purpose</p> <p><i>Error indication primitive reception of 'unidentified context' call released</i></p> <p>To verify that the IUT if the option to continue calls with no application association is not supported, shall on reception of a PSS1 Release Message (PSS1_Error primitive) containing an error notification indicating 'unidentified context', release the call. (Note: An implementation-dependent notification of the management function should occur.)</p> <p>Pre-test conditions: Node with option to continue not supported.</p>				

TSS /ERROR/	TP VPN_V_8_3	Q.765.1 reference 7.2.5/Q.765.1	Selection expression PICS A.2/3	Configuration DLE
<p>Test purpose</p> <p><i>Error indication primitive reception of 'reassembly error'</i></p> <p>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.)</p> <p>Pre-test conditions: None.</p>				

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

8 Test coverage

The test purposes defined in this test specification cover the bearer related capabilities of the VPN Application Process functions of the Q.765.1 specification.

A list containing the number of test purposes for the related requirements of Recommendation Q.765.1 is provided in Table 2.

Whenever it was possible, the test purposes have been described such that they bundle related requirements of Recommendation Q.765.1. 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 2/Q.765.1 bis – 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

9 Conformance to the PICS proforma specification

A PICS proforma that conforms to this PICS proforma specification shall be technically equivalent to Annex A and shall preserve the numbering and ordering of the items in Annex A.

A PICS that conforms to this PICS proforma specification shall:

- a) describe an implementation which is claimed to conform to ISDN User part 1997 (ISUP'97) reference specification [1] to [4];
- b) be a conforming PICS proforma which has been completed in accordance with the instructions for completion given in A.1;
- c) include the information necessary to uniquely identify both the supplier and the implementation.

PICS proforma for ISDN User Part 1997 (ISUP'97) – APM support of VPN**A.1 Instructions for completing the PICS proforma**

The supplier of the implementation shall complete the PICS proforma in each of the spaces provided. If necessary, the supplier may provide additional comments separately.

More detailed instructions are given at the beginning of the different subclauses of the PICS proforma.

A.1.1 Purposes and structure

The purpose of this PICS proforma is to provide a mechanism whereby a supplier of an implementation of the requirements defined in ISDN User Part 1997 (ISUP'97) reference specification [1] to [4] may provide information about the implementation in a standardized manner.

The PICS proforma is subdivided into subclauses for the following categories of information:

- instructions for completing the PICS proforma;
- identification of the implementation;
- identification of the reference protocol specification;
- PICS proforma tables (containing the global statement of conformance).

A.1.2 Abbreviations and conventions

The PICS proforma contained in this annex is composed of information in tabular form in accordance with the guidelines presented in ISO/IEC 9646-7 [9].

Item column

It contains a number that identifies the item in the table.

Item description column

It describes each respective item (e.g. parameters, timers, etc.).

Reference column

It gives reference to the ISUP'97 specification for the supplementary services [1] to [2], except where explicitly stated otherwise.

Status column

The following notations, defined in ISO/IEC 9646-7 [9], are used for the status column:

- m mandatory – The capability is required to be supported.
- n/a not applicable – In the given context, it is impossible to use the capability. No answer in the support column is required.
- o optional – The capability may or may not be supported.
- o.i qualified optional – For mutually exclusive or selectable options from a set. "i" is an integer which identifies a unique group of related optional items and the logic of their selection which is defined immediately following the table.

¹ **Copyright release for PICS proforma**

Users of this Recommendation may freely reproduce the PICS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed PICS.

ci conditional – The requirement on the capability ("m", "o" or "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying a unique conditional status expression that is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." shall be used to avoid ambiguities. If an ELSE clause is omitted, "ELSE n/a" shall be implied.

NOTE – Support of a capability means that the capability is implemented in conformance to the ISUP'97 specification [1] to [4].

Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7 [9], are used for the support column:

- Y or y Supported by the implementation.
- N or n Not supported by the implementation.
- N/A or – No answer required (allowed only if the status is N/A, directly or after evaluation of a conditional status).

Values allowed column

This column contains the values or the ranges of values allowed.

Values supported column

The support column shall be filled in by the supplier of the implementation. In this column the values or the ranges of values supported by the implementation shall be indicated.

References to items

For each possible item answer (answer in the support column) within the PICS proforma a unique reference exists. It is defined as the table identifier, followed by a slash character "/", followed by the item number in the table. If there is more than one support column in a table, the columns shall be discriminated by letters (a, b, etc.) respectively.

Example 1: A.5/4 would indicate the reference to the answer of item 4 in Table A.5 of Annex A.

Example 2: A.6/3b would indicate the reference to the second answer (i.e. in the second support column) of item 3 in Table A.6 of Annex A.

A.2 Identification of the implementation

Identification of the Implementation Under Test (IUT) and the system in which it resides – the System Under Test (SUT) should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

A.2.1 Date of the statement

Date of the statement:	
------------------------	--

A.2.2 Implementation Under Test (IUT) identification

IUT name:	
IUT version:	

A.2.3 System Under Test (SUT) identification

SUT name:	
Hardware configuration:	
Operating system:	

A.2.4 Product supplier

Name:	
Address:	
Telephone number:	
Facsimile number:	
Additional information:	

A.2.5 Client

Name:	
Address:	
Telephone number:	
Facsimile number:	
Additional information:	

A.2.6 ICS contact person

Name:	
Telephone number:	
Facsimile number:	
Additional information:	

A.3 Identification of the reference specification

This PICS proforma applies to the following standard: Recommendation Q.765.1 (1997).

Note that as prerequisite it is necessary to support the basic services described in [10]. A separate PICS proforma has been specified for ISUP'97 basic services [10].

A.4 PICS proforma tables

A.4.1 Global statement of conformance

	(Yes/No)
Are all mandatory capabilities implemented?	

NOTE – Answering "No" to this question indicates non-conformance to the reference protocol specification. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.

A.4.2 Roles

Table A.1/Q.765.1 bis – Roles

Item	Is the implementation ...	Reference	Status	Support
1	Local – Local exchange PIN or PAN?	6.1/Q.765	o.1	
2	TE_P – National transit exchange PIN or PAN?	6.1/Q.765	o.1	
3	Transit – National transit exchange?	Q.761	o.1	
o.1: It is mandatory to support at least one of these items.				

A.4.3 Capabilities

Table A.2/Q.765.1 bis – VPN major capabilities

Item	Is the exchange able to ...	Reference	Status	Support
1	support GFP functionality at transit PINX nodes?	Q.765.1		
2	support GFP functionality at gateway PINX nodes?	Q.765.1		
3	continue calls with no application association?	Q.765.1		
4	relocate of gateway function?	Q.765.1		
5	utilize the Corporate Telecommunications Network Identifier (CNID)?	Q.765.1		
o.1: It is mandatory to support at least one of these items.				

ANNEX B

PIXIT proforma for ISDN User Part 1997 (ISUP'97) – APM support of VPN

For further study.

ANNEX C

PICTR proforma for ISDN User Part 1997 (ISUP'97) – APM support of VPN

For further study.

ANNEX D

ATS for ISDN User Part 1997 (ISUP'97) – APM support of VPN

This annex is available as an electronic attachment.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems