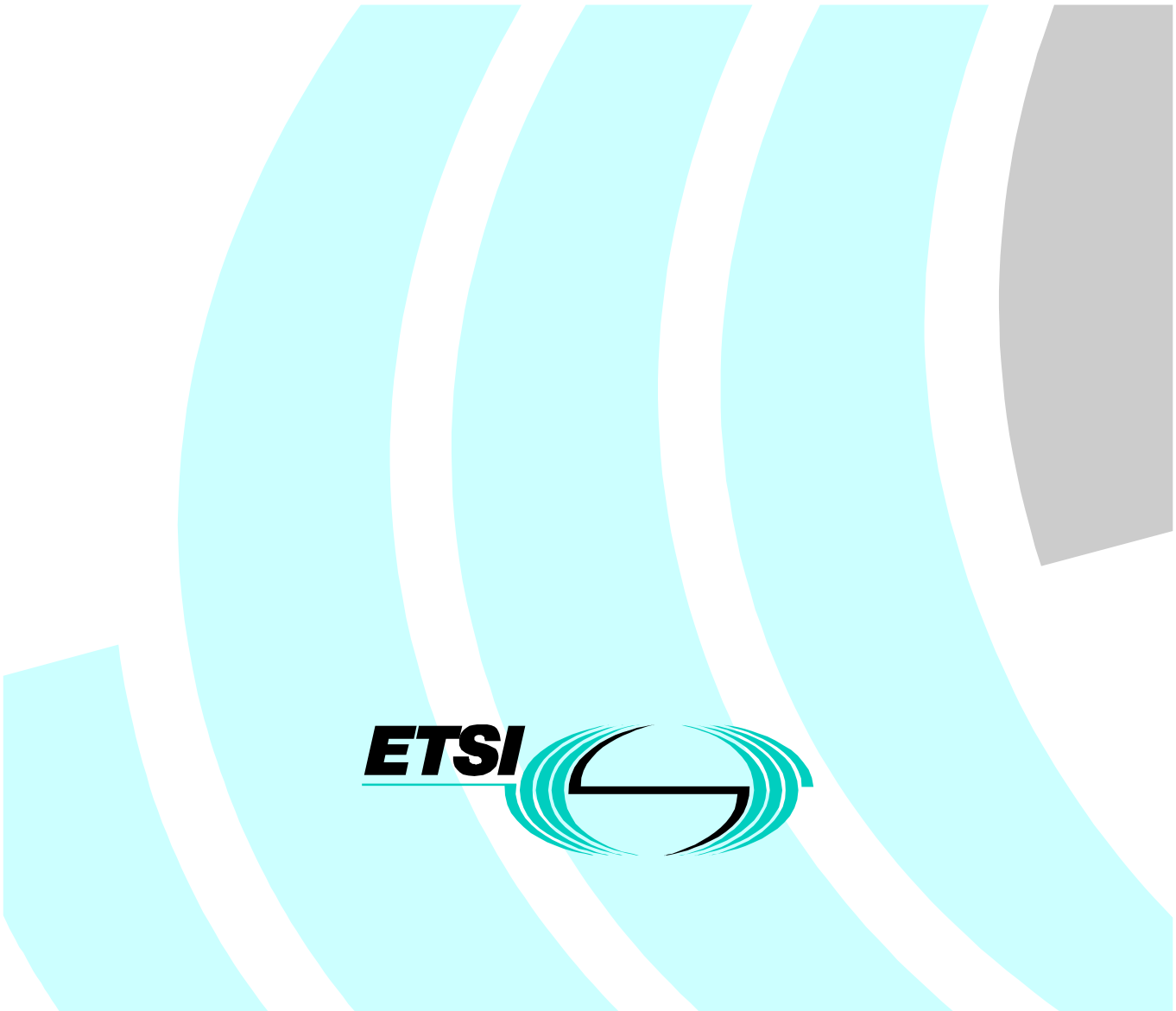
Final draft ETSI EN 302 093-4 V1.1.1 (2000-06)

European Standard (Telecommunications series)

Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification



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Contents

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Foreword

This European Standard (Telecommunications series) has been produced in joint activity by ETSI Technical Committee Signalling Protocol and Switching (SPS) and ECMA TC32 - TG15, and is now submitted for the Voting phase of the ETSI standards Two-step Approval Procedure.

The present document is part 4 of a multi-part standard covering the Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment, as identified below:

Part 1: "Protocol specification";

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) proforma specification".

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

The present document the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the T_B reference point or coincident S_B and T_B reference point (as defined in ITU-T Recommendation I.413 [11]) of implementations conforming to the standards for the signalling user-network layer 3 specification for the bearer control protocol for point-to-point multiconnection calls of the Digital Subscriber Signalling System No. two (DSS2) protocol for the pan-European Broadband Integrated Services Digital Network (B-ISDN), EN 302 093-1 [1].

A further part of the present document specifies the Test Suite Structure and Test Purposes (TSS&TP) related to this ATS and partial PIXIT proforma.

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 302 093-1: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment; Part 1: Protocol specification".

[2] ETSI EN 302 093-2: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

[3] ETSI EN 302 093-3: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification".

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

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

[6] ISO/IEC 9646-3: "Information Technology - Open Systems Interconnection -Conformance testing methodology and framework, Part 3: The Tree and Tabular Combined Notation".

[7] ISO/IEC 9646-4: "Information Technology - Open Systems Interconnection -Conformance testing methodology and framework, Part 4: Test realization".

[8] ISO/IEC 9646-5: "Information Technology - Open Systems Interconnection -Conformance testing methodology and framework, Part 5: Requirements on test laboratories and clients for the conformance assessment process".

[9] ETSI EN 302 092-1: "Broadband Integrated Services Digital Network (B-ISDN) and Broadband Private Integrated Services Network (B-PISN); Digital Subscriber Signalling System No. two (DSS2), Broadband Inter-Exchange Signalling (B-QSIG), and Signalling System No. 7 (SS7); Call control in a separated call and bearer control environment; Part 1: Protocol specification".

[10] ETSI EN 302 093-4: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification".

[11] ITU-T Recommendation I.413: "B-ISDN user-network interface".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply in addition to the definitions in EN 302 092-1 [9]:

Abstract test case: Refer to ISO/IEC 9646-1 [4]

Abstract Test Method (ATM): Refer to ISO/IEC 9646-1 [4]

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [4]

Implementation Under Test (IUT): Refer to ISO/IEC 9646-1 [4]

Lower tester (LT): Refer to ISO/IEC 9646-1 [4]

Protocol Implementation Conformance Statement (PICS): Refer to ISO/IEC 9646-1 [4]

PICS proforma: Refer to ISO/IEC 9646-1 [4]

Protocol Implementation eXtra Information for Testing (PIXIT): Refer to ISO/IEC 9646-1 [4]

PIXIT proforma: Refer to ISO/IEC 9646-1 [4]

Point of Control and Observation (PCO): Refer to ISO/IEC 9646-1 [4]

System Under Test (SUT): Refer to ISO/IEC 9646-1 [4]

Test Purpose (TP): Refer to ISO/IEC 9646-1 [4]

Upper Tester (UT): Refer to ISO/IEC 9646-1 [4]

3.2 Abbreviations

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

ATM	Abstract Test Method
ATS	Abstract Test Suite
B-ISDN	Broadband Integrated Services Digital Network
CM	Co-ordination Message
CP	Co-ordination Point
DSS2	Digital Subscriber Signalling System No. two
ExTS	Executable Test Suite
IUT	Implementation Under Test
LT	Lower Tester
MOT	Means Of Testing

MTC	Main Test Component
PCO	Point of Control and Observation
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PTC	Parallel Test Component
SUT	System Under Test
TCP	Test Co-ordination Procedures
TP	Test Purpose
TTCN	Tree and Tabular Combined Notation
UT	Upper Tester

4 Abstract Test Method

4.1 Description of ATM used

The requirement for testing the network IUT is to focus on the behaviour of the network IUT at the user-network interface where a T_B reference point or coincident S_B and T_B reference point applies. Thus the IUT is the network DSS2 protocol entity at a particular user-network interface and is not the whole network.

It is possible to specify an ATS based on a Single party (remote) test method for such an IUT. However, it is considered that an ATS based on such an approach is of limited use as the only way to specify IUT generated PDUs is to use the "implicit send" statement. Many users of such an ATS would replace the "implicit send" statements with descriptions of the behaviour at other interfaces.

An ATS based on a multi-party test method is considered to be more useful in that it is closer to how a real test suite would be constructed. Such a test method specifies behaviour at multiple network interfaces. One very important limitation here is that tests are focussed on one particular interface. Thus the test system is made up one Main Test Component (MTC) and one or more Parallel Test Components (PTC), see figure 1.

4.2 Conventions for test components and PCOs

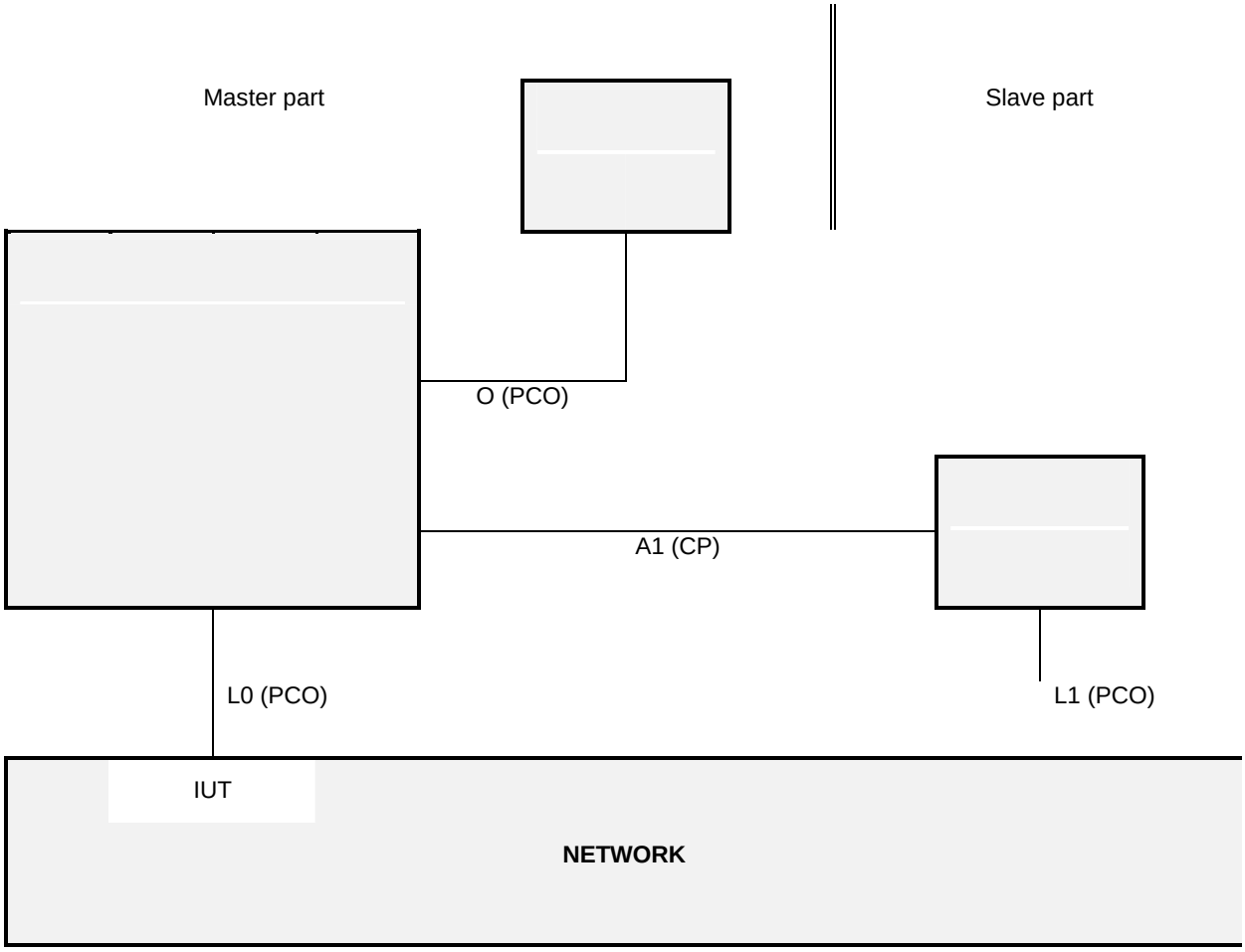

Figure 1: Multi-party test method

In a master/slave arrangement, the MTC is considered to be the master while the PTCs are the slaves. The "slave" testers are only an explicit description of how to deal with the remote interfaces during the testing process, i.e. "how to make the IUT send the required message".

This means, in particular, that the verdict will only be assigned from the protocol aspects observed on *the* interface under test (i.e. by the "master" tester), as it would be observed by a terminal connected to this interface. A failure in the correlation between the protocol at the different interfaces to which the different testers are connected, i.e. in the mechanism of the functional service itself, will not cause a FAIL verdict. For instance, if the IUT fails to send a message on the tested interface after another interface has received the proper stimulus, the verdict will be INCONCLUSIVE.

The MTC MTCA has two functions in this configuration. Firstly, it has the MTC function of controlling the one or more PTCs. Thus it is responsible for starting the PTCs and afterwards co-ordinates activities by exchanging Co-ordination Messages (CM) with the PTCs. Secondly it is responsible for the behaviour of the Lower Tester (LT) at PCO L0.

A combination of the remote and multi-party test methods is applied. As can be seen from figure 1, several PCOs are used. All PCOs reside at the service access points between layers 2 and 3.

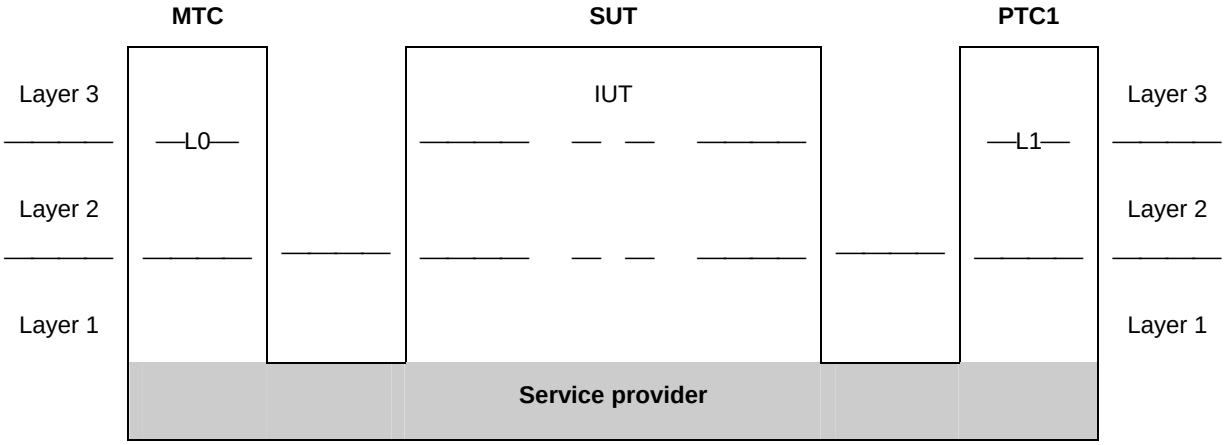

Figure 2: Combination of the remote and multi-party test methods

The MTC PCO is named "L0" ("L" for Lower) and "O". The L0 PCO is used to control and observe the behaviour of the IUT and test case verdicts are assigned depending on the behaviour observed at this PCO. ISO/IEC 9646-2 [5] allows the informal expression of Test Co-ordination Procedures (TCP) between the System Under Test (SUT) upper layer(s) and the Lower Tester (LT). In the ATS contained in annex C, TCP is achieved by use of a second "informal" PCO, called "O" (for Operator). This PCO is used to specify control but not observation above the IUT and consequently, events at this PCO are never used to generate test case verdicts. The use of this O PCO is regarded as a preferred alternative to the use of the implicit send event, in that it allows the ATS to specify in a clear and meaningful way what actions are required to be performed on the IUT. As an alternative of L1, the O PCO is used for an end CC enity.

The PTC PTC1 uses PCOs L1. These PCO is used to control and, in a limited way, observe the behaviour of the network equipment at interface other than the one under test. No verdicts are assigned at this PCO.

As stated in a previous paragraph, the non-receipt of network generated messages at L0, which are stimulated by events at the L1, will result in INCONCLUSIVE rather than FAIL verdicts being assigned.

In test cases which verify that the IUT rejects invalid or unacceptable SETUP messages and in the majority of the test cases for the restart procedures, no PTC is activated at all, as these procedures are considered local to the access between IUT and MTC.

5 Untestable test purposes

There are no untestable test purposes associated with this ATS.

6 ATS to TP map

The identifiers used for the TPs are reused as test case names. Thus there is a straightforward one-to-one mapping.

7 PCTR conformance

A test laboratory, when requested by a client to produce a PCTR, is required, as specified in ISO/IEC 9646-5 [8], to produce a PCTR conformant with the PCTR template given in annex B of ISO/IEC 9646-5 [8].

Furthermore, a test laboratory, offering testing for the ATS specification contained in annex C, when requested by a client to produce a PCTR, is required to produce a PCTR conformant with the PCTR proforma contained in annex A of the present document.

A PCTR which conforms to this PCTR proforma specification shall preserve the content and ordering of the clauses contained in annex A. Clause A.6 of the PCTR may contain additional columns. If included, these shall be placed to the right of the existing columns. Text in italics may be retained by the test laboratory.

8 PIXIT conformance

A test realizer, producing an executable test suite for the Abstract Test Suite (ATS) specification contained in annex C, is required, as specified in ISO/IEC 9646-4 [7], to produce an augmented partial PIXIT proforma conformant with this partial PIXIT proforma specification.

An augmented partial PIXIT proforma which conforms to this partial PIXIT proforma specification shall, as a minimum, have contents which are technically equivalent to annex B. The augmented partial PIXIT proforma may contain additional questions that need to be answered in order to prepare the Means Of Testing (MOT) for a particular Implementation Under Test (IUT).

A test laboratory, offering testing for the ATS specification contained in annex C, is required, as specified in ISO/IEC 9646-5 [8], to further augment the augmented partial PIXIT proforma to produce a PIXIT proforma conformant with this partial PIXIT proforma specification.

A PIXIT proforma which conforms to this partial PIXIT proforma specification shall, as a minimum, have contents which are technically equivalent to annex B. The PIXIT proforma may contain additional questions that need to be answered in order to prepare the test laboratory for a particular IUT.

9 ATS Conformance

The test realizer, producing a Means Of Testing (MOT) and Executable Test Suite (ExTS) for this Abstract Test Suite (ATS) specification, shall comply with the requirements of ISO/IEC 9646-4 [7]. In particular, these concern the realization of an Executable Test Suite (ExTS) based on each ATS. The test realizer shall provide a statement of conformance of the MOT to this ATS specification.

An ExTS which conforms to this ATS specification shall contain test groups and test cases which are technically equivalent to those contained in the ATS in annex C. All sequences of test events comprising an abstract test case shall be capable of being realized in the executable test case. Any further checking which the test system might be capable of performing is outside the scope of this ATS specification and shall not contribute to the verdict assignment for each test case.

Test laboratories running conformance test services using this ATS shall comply with ISO/IEC 9646-5 [8].

A test laboratory which claims to conform to this ATS specification shall use an MOT which conforms to this ATS.

Annex A (normative): Protocol Conformance Test Report (PCTR) proforma

A.1 Identification summary

A.1.1 Protocol conformance test report

PCTR number:	
PCTR Date:	
Corresponding SCTR number:	
Corresponding SCTR date:	
Test Laboratory identification:	
Test Laboratory Manager:	
Signature:	

A.1.2 IUT identification

Name:	
Version:	
Protocol specification:	EN 302 093-1
PICS:	EN 302 093-2
Previous PCTRs (if any)	

A.1.3 Testing environment

PIXIT Reference number:	
ATS Specification:	EN 302 093-4
Abstract Test Method:	Remote test method (see ISO/IEC 9646-2)
Means of Testing identification:	
Dates of testing:	
Conformance Log reference(s):	
Retention Date for Log reference(s):	

A.1.4 Limits and reservations

Additional information relevant to the technical contents or further use of the test report, or to the rights and obligations of the test laboratory and the client, may be given here. Such information may include restriction on the publication of the report.

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A.1.5 Comments

Additional comments may be given by either the client or the test laboratory on any of the contents of the PCTR, for example, to note disagreement between the two parties.

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A.2 IUT Conformance status

This IUT has or has not been shown by conformance assessment to be non-conforming to the specified protocol specification.

Strike the appropriate words in this sentence. If the PICS for this IUT is consistent with the static conformance requirements (as specified in clause A.3 of this report) and there are no "FAIL" verdicts to be recorded (in clause A.6) strike the words "has or", otherwise strike the words "or has not".

A.3 Static conformance summary

The PICS for this IUT is or is not consistent with the static conformance requirements in the specified protocol.

Strike the appropriate words in this sentence.

A.4 Dynamic conformance summary

The test campaign did or did not reveal errors in the IUT.

Strike the appropriate words in this sentence. If there are no "FAIL" verdicts to be recorded (in clause A.6 of this report) strike the words "did or", otherwise strike the words "or did not".

Summary of the results of groups of tests:

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A.5 Static conformance review report

If clause A.3 indicates non-conformance, this subclause itemizes the mismatches between the PICS and the static conformance requirements of the specified protocol specification.

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A.6 Test campaign report

ATS Reference	Selected ? (Y/N)	Run ? (Y/N)	Verdict	Observations
L3BC_01_01				
L3BC_01_02				
L3BC_02_01				
L3BC_02_02				
L3BC_03_01				
L3BC_03_02				
L3BC_03_03				
L3BC_03_04				
L3BC_03_05				
L3BC_03_06				

A.7 Observations

Additional information relevant to the technical content of the PCTR are given here.

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Annex B (normative): Partial PIXIT proforma

B.1 Identification summary

PIXIT Number:

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Test Laboratory Name:

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Date of Issue:

.....

Issued to:

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B.2 Abstract test suite summary

Protocol Specification:	EN 302 093-1
ATS Specification:	EN 302 093-4
Abstract Test Method:	Remote test method (see ISO/IEC 9646-2)

B.3 Test laboratory

Test Laboratory Identification:

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Accreditation status of the test service:

.....

Accreditation reference:

.....

Test Laboratory Manager:

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Test Laboratory contact:

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Means of Testing:

.....

Test Laboratory instructions for Completion:

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B.4 Client (of the Test Laboratory)

Client Identification:

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Client Test manager:

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Client contact:

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Test Facilities required:

.....

B.5 SUT

Name:

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Version:

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SCS Reference:

.....

Machine configuration:

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Operating System Identification:

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IUT Identification:

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PICS (all layers):

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Limitations of the SUT:

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Environmental Conditions:

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B.6 Protocol information

B.6.1 Protocol identification

Specification reference: EN 302 093-1

Protocol Version:

PICS Reference: EN 302 093-2

B.6.2 Configuration to be tested

Table B.1: Configuration to be tested

Item	Configuration The access to be tested ...	Supported Y/N
1.1	is the originating point of the bearer control connection	
1.2	is the terminating point of the bearer control connection	
1.3	is a point of call/bearer co-ordination	

B.6.3 Test management timers

Table B.2: Timer values

Item	Timer Give a value for the timer that is used ...	Value (in seconds)
2.1	to wait for the IUT to respond to a stimulus sent by the tester (TAC).	
2.2	to control that the IUT does not respond to a stimulus sent by the tester (TNOAC).	
2.3	to wait for the test operator to perform an implicit send action or to wait for a PTC to react (TWAIT).	
NOTE: The IUT provider may fill in a value range rather than a fixed value for the test management timers. During test execution the test laboratory will choose specific values for the timers dependant on the means of testing used. These specific values may even be beyond the range given by the IUT provider, if this is necessary for achieving satisfactory test results.		

B.6.4 Parameter Values

Table B.3: Parameter values

Item	Parameter values Give ...	Value
Call association		
3.1	Value of the call association for a recognized connection	
3.2	Value of the call association for an unrecognized connection	
Bearer identifier		
3.3	Bearer identifier value	
Broadband bearer capability		
3.4	a coding of a Broadband bearer capability information element, which the IUT is compatible with, for the purpose of accepting outgoing calls.	
Called party number		
3.5	a coding of the Type of number and the Addressing/Numbering plan identification fields of the Called party number information elements to be sent to the IUT.	
3.6	a coding of the number digits of the access related to the PTC1.	
3.7	a coding of the number digits of a subscriber at the access related to the MTC.	
ATM traffic descriptor		
3.8	a coding of an ATM traffic descriptor information element, which the IUT is compatible with, for the purpose of accepting outgoing calls.	
Connection identifier		
3.9	a value for the preferred VPCI.	
3.10	a value for the preferred VCI.	

Annex C (Normative): Abstract Test Suite (ATS)

This ATS has been produced using the Tree and Tabular Combined Notation (TTCN) according to ISO/IEC 9646-3 [6].

The ATS was developed on a separate TTCN software tool and therefore the TTCN tables are not completely referenced in the table of contents. The ATS itself contains a test suite overview part which provides additional information and references.

C1 The TTCN Graphical form (TTCN.GR)

The TTCN.GR representation of this ATS is contained in an Adobe Portable Document Format™ file (TD048b.PDF contained in archive en_30209304v010101v0.ZIP) which accompanies the present document.

C2 The TTCN Machine Processable form (TTCN.MP)

The TTCN.MP representation corresponding to this ATS is contained in an ASCII file (TD047b.MP contained in archive en_30209304v010101v0.ZIP) which accompanies the present document.

History

Document history			
V1.1.1	December 1999	Public Enquiry	PE 200016: 1999-12-22 to 2000-04-21
V1.1.1	June 2000	Vote	V 20000825: 2000-06-26 to 2000-08-25