INTERNATIONAL STANDARD

ISO/IEC 8882-3

Third edition
2000-04-15

Information technology — Telecommunications and information exchange between systems — X.25 DTE conformance testing —

Part 3: Packet layer conformance test suite

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Test de conformité X.25 DTE —

Partie 3: Suite d'essais de conformité pour la couche paquet

Reference number
ISO/IEC 8882-3:2000(E)

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Printed in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 8882-3 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 8882-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This third edition cancels and replaces the second edition (ISO/IEC 8882-3:1995), which has been technically revised.

ISO/IEC 8882 consists of the following parts, under the general title *Information technology — Telecommunications and information exchange between systems — X.25 DTE conformance testing*:

— *Part 1: General principles*

— *Part 2: Data link layer conformance test suite*

— *Part 3: Packet layer conformance test suite*

Annex A forms a normative part of this part of ISO/IEC 8882.

Introduction

This part of ISO/IEC 8882 specifies a set of tests to evaluate Data Terminal Equipment (DTE) conformance to International Standards ISO 7776:1986, ISO 7776:1995 (X.25 LAPB) and/or ISO 8208:1987, ISO 8208:1990, ISO 8208:1995 (X.25 Packet Layer). ISO 7776 (1986,1995) and ISO 8208 (1987,1990, 1995) allow for a DTE to interface with a Data Circuit-Terminating Equipment (DCE) conforming to CCITT respectively ITU-T Recommendation X.25 or to another DTE conforming to ISO 7776 (1986,1995) and/or ISO 8208 (1987,1990, 1995) also allows for connection to Local Area Networks.

CCITT respectively ITU-T Recommendation X.25 1980, X.25 1984, X.25 1988 and X.25 1993 are written from the perspective of a DCE and therefore do not explicitly specify the DTE operation. However, recommended operation of DTEs is included by implication because of the need to communicate with X.25 DCEs. Tests within this part of ISO/IEC 8882 pertaining to X.25 1980, X.25 1984, X.25 1988 and X.25 1993 are based on the DTE operational characteristics implied by CCITT X.25 respectively ITU-T X.25.

This part of ISO/IEC 8882 presents the packet layer aspects for evaluating conformance to ISO 8208 (1987, 1990, 1995) and follows the procedures and guidelines defined in ISO/IEC 9646.

Where it is claimed that X.25 is used to provide the OSI Network Layer Service, the conformance tests as defined in this part of ISO/IEC 8882 can be used to verify the implementation of the necessary protocol elements.

The test suite is presented in an abstract form by means of the test case notation TTCN, as defined in ISO/IEC 9646-3. This is an abstract set of tests. Not every test applies to every public network or every type of DTE.

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Part 3:
Packet layer conformance test suite

1 Scope

This part of ISO/IEC 8882 specifies a set of abstract tests for verifying that the implementation of X.25 protocols for use by Data Terminal Equipment (DTE), conforms to the requirements of International Standards that specify those protocols.

Testing of a DCE is not subject of this test suite. Testing of a DTE in DCE mode is covered in test group 28 of this test suite

a) specifies a PIXIT proforma;

b) describes the relationship of the PICS to the test suite,

c) describes the relationship of the PIXIT to the test suite,

d) specifies a set of abstract tests using TTCN Graphical notation.

This part of ISO/IEC 8882 defines the testing of a DTE operating at the packet layer designed to access a public or private packet-switched network conforming to CCITT respectively ITU-T Recommendation X.25 (1980, 1984, 1988, 1993) or another DTE conforming to ISO 8208. The specification of test cases in executable/machine processable TTCN is outside the scope of this part of ISO/IEC 8882.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 8882. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 8882 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 7498-1:1994, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model.* (See also ITU-T Recommendation X.200)

ISO/IEC 7776:1995, *Information technology — Telecommunications and information exchange between systems — High-level data link control procedures — Description of the X.25 LAPB-compatible DTE data link procedures.*

ISO/IEC 8208:1987, *Information processing systems — Data communication — X.25 Packet Layer Protocol for Data Terminal Equipment.*

ISO/IEC 8208:1990, *Information technology — Data communication — X.25 Packet Layer Protocol for Data Terminal Equipment.*

ISO/IEC 8208:1995, *Information technology — Data communication — X.25 Packet Layer Protocol for Data Terminal Equipment.*

ISO/IEC 8824:1990, *Information technology — Open Systems Interconnection — Specification of Abstract Syntax Notation One (ASN.1).*

ISO/IEC 8882-1:1996, *Information technology — Telecommunications and information exchange between systems — X.25 DTE conformance testing — Part 1: General principles.*

ISO/IEC 8886:1992, *Information technology — Telecommunications and information exchange between systems — Data link service definition for Open Systems Interconnection.*

ISO/IEC 9646-1:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts.* (See also ITU-T Recommendation X.290)

ISO/IEC 9646-2:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 2: Abstract Test suite Specification*. (See also ITU-T Recommendation X.291)

ISO/IEC 9646-3:1998, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 3: The Tree and Tabular Combined Notation (TTCN)*.

ISO/IEC 9646-4:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 4: Test realization*. (See also ITU-T Recommendation X.293)

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*. (See also ITU-T Recommendation X.294)

CCITT Recommendation X.25 (1980), X.25 (1984), and X.25 (1988), *Interface between Data Terminating Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode on the public data networks*.

ITU-T Recommendation X.25 (1993), *Interface between Data Terminating Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to the public data networks by dedicated circuit*.

3 Terms and definitions

3.1 Reference model terms

This part of ISO/IEC 8882 makes use of the following term defined in ISO 7498.

a) (N)-protocol-data-unit (N-PDU)

3.2 Conformance testing terms

This part of ISO/IEC 8882 makes use of the following terms defined in ISO/IEC 9646

a) Abstract Test Suite

b) Conforming System or Implementation

c) Conformance Test Suite

d) Conformance Testing

e) Executable Test Suite

f) Postamble

g) Preamble

h) Protocol Implementation Conformance Statement

i) Protocol Implementation eXtra Information for Testing

j) Test Group

k) Test Step

l) Test Suite

3.3 X.25 DTE conformance testing terms

This part of ISO/IEC 8882 makes use of the following terms defined in ISO/IEC 8882-1.

a) Improper PDU

b) Inopportune PDU

c) Proper PDU

d) Test Subgroup

e) Test Selection

f) Tester

g) Transient States

3.4 Additional terms and definitions

For the purposes of this part of ISO/IEC 8882, the following terms and definitions apply.

3.4.1
proper packet
packet that is a proper PDU

3.4.2
improper packet
packet that is an improper PDU

3.4.3
inopportune packet
packet that is an inopportune PDU

4 Abbreviations

The following abbreviations are used in this part of ISO/IEC 8882.

ADX Address
ASP Abstract Service Primitive
ATS Abstract Test Suite
ETS Executable Test Suite
FAC Facility
IUT Implementation Under Test
LCI Logical Channel Identifier
LEN Length
PCO Point of Control and Observation
PDU Protocol Data Unit
PICS Protocol Implementation Conformance
PIXIT Protocol Implementation eXtra Information for Testing
PKT Packet
PLG Packet Layer Group
RX Receive
TST Tester
TX Transmit
UDF User Data Field

5 Conformance

The test realizer shall comply with the requirements of ISO/IEC 9646-4. In particular, these concern the realization of an ETS based on the ATS. Test laboratories running conformance test services for this abstract test suite shall comply with ISO/IEC 9646-5.

6 Test suite information

6.1 Packet layer test suite structure

The packet layer tests are grouped as shown in Table 1.

Table 1 — Packet layer test groups

Test Group #	Packet layer test groups	Test group #	Packet layer test groups
1	R1 - Packet Layer Ready	15	I2 - DTE Interrupt Sent
2	R2 - DTE Restart Request	16	J1 - DXE Interrupt Ready
3	R3 - DXE Restart Ind	17	J2 - DXE Interrupt Sent
4	P1 - Ready	18	F1 - DXE Receive Ready
5	P2 - DTE Call Request	19	F2 - DXE Receive Not Ready
6	P3 - DXE Incoming Call	20	G1 - Receive Ready
7	P4 - Data Transfer	21	G2 - DTE Receive Not Ready [a]
8	P5 - Call Collision	22	Data Transfer
9	P6 - DTE Clear Request	23	Timer Tests
10	P7 - DXE Clear Indication	24	Address
11	D1 - Flow Control Ready	25	Facility
12	D2 - DTE Reset Request	26	Registration
13	D3 - DXE Reset Ind	27	Multiple Logical Channel Asg
14	I1 - Interrupt Ready	28	DTE/DTE Tests

[a] This group has been deleted, but the number has been retained for consistency.

For each test group that tests a packet layer state (PLG1 through PLG28) the test cases specified are categorized into the following three subgroups.

- Subgroup 1 contains test cases in which the Tester transmits a proper test packet, these test cases are identified with a one hundred series test case identifier xx_1xx.
- Subgroup 2 contains test cases in which the Tester transmits an improper test packet, these test cases are identified with a two hundred series test case identifier xx_2xx.
- Subgroup 3 contains test cases in which the Tester transmits an inopportune test packet, these test cases are identified with a three hundred series test case identifier xx_3xx.

6.2 Packet layer initialization

In accordance with ISO 8208 (1987, 1990, 1995) the DTE must transmit a Restart Request whenever link layer initialization has completed. However, DTEs developed in conformance with the 1980, 1984, 1988, and 1993 versions of Recommendation X.25 are not required to send a Restart Request at this time. To accommodate both DTE implementations, the Tester initiates the restart procedure upon completion of link layer initialization.

The Tester will accept either a Restart Confirmation or a Restart Request as a valid response to its Restart Indication as shown below in example EG_001. Packet layer initialization always occurs once at the start of a test session. State initialization, on the other hand, is performed many times during a test session as part of each test case. Packet layer initialization will also occur as part of state initialization when the previously executed test case results in a Fail or Inconclusive verdict, or the previously executed test case is part of PLG 1, 2, 3, 26 or in test groups in which the Restart procedure is executed as part of state initialization (PLG 1, 2, 3 and 26).

The following are examples of initialization of ISO 8208 over ISO 7776 (LAPB). Any other examples of initialization sequences using other underlying protocols are not shown, but may be appropriate. For example, normal state initialization steps in state r1 (PLG 1) are as shown in Table 2.

For those DTEs which disconnect the link upon receipt of a Restart Indication (or transmittal of a Restart Request) the state initialization steps include link layer initialization as shown in Table 3.

Table 2 — Test Case Dynamic Behavior

Test Case Name: EG_001
Group: Example Test Step / Packet Layer Initialization
Purpose: An example test step illustrating Packet Layer Initialization
Default:
Comments:

Nr	Label	Dynamic Behavior	Constraint Ref	Verdict	Comments
1		! Restart_Indication START TD	STRT_DCE		1
2		? Restart_Confirmation CANCEL TD	STRTC		
3		? Restart_Request CANCEL TD	STRT_DTEA		
4		? TIMEOUT TD		FAIL	4
5		? OTHERWISE		FAIL	

Detailed Comments:
1. The Restart Indication is sent upon successful initialization of the Data Link Layer.
4. TD expired.

Table 3 — Test Step Dynamic Behavior

Test Case Name : EG_002
Group : Example Test Step / Packet Layer Initialization / Link Layer Initialization
Objective : An example test step Illustrating Packet Layer Initialization that includes Data Link Layer Initialization
Default :
Comments : a) L is the PCO at the Tester Packet Layer to Link Layer interface.
: b) D is the PCO at the Link Layer to Physical Interface.
: c) This example uses the Multi-Layer testing method, the Packet Layer Test Suite only uses the Remote Single-layer test method.

Nr	Label	Dynamic Behavior	Constraint Ref	Verdict	Comments
1		EG_002 [L,D]			
2		L! Restart Indication START TD	STRT_DCE		
3		L? Restart Confirmation START TD	STRTC		
4		D? Dlsconnect CANCEL TD	DISC_1		4
5		+ LINK_INIT			
6		L? TIMEOUT TD			6
7		L? Restart_Request START TS	STRT_DTEA		
8		D? Disconnect CANCEL TD	DISC_1		
9		+ LINK_INIT			
10		L? TIMEOUT TD		FAIL	
11		L? TIMEOUT TD		FAIL	
12		L? OTHERWISE		FAIL	
13		LINK_INIT			
14		D! UA	UA_DCE		14
15		D? SABM	SABM1		15
16		D! UA	UA_DCE		14
17		L! Restart_Indication START TD	STRT_DCE		
18		L? Restart_Confirmation CANCEL TD	STRTC		
19		L? Restart_Request CANCEL TD	STRT_DTEA		
20		L? TIMEOUT TD		FAIL	
21		L? OTHERWISE CANCEL TD		FAIL	

Detailed Comments:
4 Wait for DISC
6 TD expired
14 Send UA
15 Wait for SABM