INTERNATIONAL STANDARD

ISO/IEC 8208

Second edition
1990-03-15

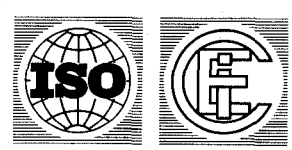
AMENDMENT 3
1991-06-01

Information technology — Data communications — X.25 Packet Layer Protocol for Data Terminal Equipment

AMENDMENT 3: Conformance requirements

Technologies de l'information — Communication de données — Protocole X.25 de couche paquet pour terminal de données

AMENDEMENT 3: Prescriptions de conformité



Reference number
ISO/IEC 8208 : 1990/Amd.3 : 1991 (E)

Contents

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.

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.

Amendment 3 to International Standard ISO/IEC 8208 : 1990 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology.*

Introduction

This amendment to ISO/IEC 8208: 1990 consists of four items to be added to ISO/IEC 8208:1990. The two main items are a new clause 21 which states the conformance requirements for implementations of ISO/IEC 8208, and a new annex containing the Protocol Implementation Conformance Statement (PICS) proforma for ISO/IEC 8208:1990. The other two items add related material to clauses 1 and 2 (Scope and Normative references). The remaining clauses 3 to 20, and the present annexes, of ISO/IEC 8208:1990 are unchanged by this amendment.

Information technology — Data communications — X.25 Packet Layer Protocol for Data Terminal Equipment

AMENDMENT 3: Conformance requirements

Instructions for amending ISO/IEC 8208 : 1990 are given in italics and numbered from 1 to 4; clause numbers and titles in this amendment correspond to those in ISO/IEC 8208 : 1990.

1 Scope

1. Add the following paragraph at the end of clause 1, Scope.

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented. Such a statement is called a Protocol Implementation Conformance Statement (PICS), as defined in ISO/IEC 9646-1. This International Standard provides the PICS proforma in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-2.

2 Normative references

2. Add the following references in clause 2, Normative references, after that for ISO/IEC 9574:1989.

ISO/IEC 9646-1:1991, *Information technology — OSI conformance testing methodology and framework — Part 1: General concepts.*

ISO/IEC 9646-2:1991, *Information technology — OSI conformance testing methodology and framework — Part 2: Abstract test suite specification.*

3. Add the following new clause 21.

21 Conformance

21.1 Static conformance

NOTE — Many DTE capabilities are optional. Designers of DTEs should be aware that use by a DTE of certain options to the exclusion of others may adversely affect the DTE's general interconnection capabilities, since complementary options may not be supported by the DXE or remote DTE (for example, the use of only modulo 128 packet sequencing, or use of only Fast Select in call setup).

21.1.1 General requirements

A DTE that claims conformance to this International Standard shall implement:

a) either Permanent Virtual Circuit Service or Virtual Call Service (and may support both);

b) operation in either a DTE/DCE or DTE/DTE environment (and may support both);

c) in the case of operation in a DTE/DTE environment, operation with the role as DTE or DCE either

1) initialized to DTE, or
2) initialized to DCE, or
3) dynamically selected according to the procedures in 4.5

(and may support more than one of these methods of role selection);

d) either modulo 8 packet sequencing or modulo 128 packet sequencing (and may support both);

e) the functions specified in table 37 as Mandatory or as Conditional when the relevant conditions apply, according to the procedures specified in the clauses to which the table items refer;

f) the timers and retransmission counters specified in table 38 as Mandatory, or as Conditional when the relevant conditions apply;

g) the mapping onto the Data Link Layer as specified in clause 3, third items (a) to (c); 3.3 first item (d); clause 10; and 12.1 (Data Link Layer Information Fields, Data Link Service data units)

Such a DTE shall not implement the functions specified in table 37 as Prohibited, when the relevant conditions apply.

Table 37 — DTE capabilities for static conformance

Item no.	DTE capability [Clauses specifying the corresponding procedures]	Service: PVC	Service: VC
1	Restarting the packet layer:		
1a	- as initiator [4, 4.1, 4.3, 4.4]	M	M
1b	- as responder [4, 4.2, 4.3, 4.4]	M	M
2	Support of DIAGNOSTIC packet:		
2a	- receipt [11.1]	M /DCE: X /DTE: O	M /DCE: X /DTE:O
2b	- sending [11.1]		
3	Virtual Call setup:		[M]
3a	- initiating an outgoing VC, with subsequent acceptance or rejection [5, 5.2.1, 5.2.4, 5.2.5, 5.5.2, 5.5.4] (Note 1)	-	O
	Receiving an incoming VC and responding by:		
3b	- acceptance [5, 5.2.2, 5.2.3, 5.2.5] (Note 1)	-	O
3c	- rejection [5, 5.2.2, 5.2.5, 5.3, 5.5, 5.5.1, 5.5.3, 5.5.4] (Notes 1, 2)	-	O
4	Aborting an outgoing VC attempt, by clearing [5.4, 5.5, 5.5.1, 5.5.3, 5.5.4] (Note 3)	-	O
5	Clearing an established VC (Note 3)		
5a	- as initiator [5.5, 5.5.1, 5.5.3, 5.5.4]	-	O
5b	- as responder [5.5, 5.5.2, 5.5.4]	-	O
6	Response to errors and unsupported packets on an assigned logical channel - expiry of T21 [5.2.1, 5.4] or R22 [8.1] - received packets causing the ERROR procedure in Call Setup and Call Clearing states [table 33] - received CLEAR INDICATION if clearing as responder is not supported (item 5b) - received RESET INDICATION if resetting as responder is not supported (item 8b) by:	-	[M]
6a	- initiating clearing		O
6b	- initiating restarting (Notes 4, 5, 6, 7)		O
6c	- other		X
7	Response to other errors and to receipt of other unsupported packets, or fields of packets, on an assigned logical channel, by:	[M]	[M]
7a	- initiating clearing [6.3, 6.4, 6.6, 6.8.1, 6.8.2,	-	O
7b	- initiating restarting 7.1.3, 7.1.4, 8.2, 11.2.1,	O	O
7c	- initiating resetting 13.4.1, tables 34, 35, 36]	O	O
7d	- other (Notes 5, 6, 7, 8)	X	X
8	Resetting a logical channel:		
8a	- as initiator [8, 8.1, 8.3, 8.4] (Note 9)	O	O
8b	- as responder [8, 8.2, 8.3, 8.4] (Note 10)	O	O

Where:

M = Mandatory X = Prohibited O = Optional
[M] = at least one of the items in this group shall be supported
\- = not applicable to the PVC service
/DCE: = specification for operation in a DTE/DCE environment
/DTE: = specification for operation in a DTE/DTE environment

NOTES

1 The reference to 5.2.5 (call collision) applies only if two-way logical channels are supported.

2 Rejection because of errors is covered by item 6.

Table 37 (concluded)

3 Although many implementations that support VCs will be designed to implement call clearing as a matter of course, clearing is classed as optional because implementations are free to initiate a restart at any time; some implementations, therefore, may exercise this freedom in situations where call clearing would otherwise apply.

4 This item does not include unrecognized or unsupported facility codes within a Facilities Field (15.1).

5 Where optional capabilities are specified for these items, the DTE may choose any permitted option on each occasion that an error, etc., occurs, independently of the options chosen on other occasions or for other errors, etc.

6 Packets with LCI = 0 are excluded, since that is not an assigned logical channel (figure 1).

7 The clauses and tables listed are those specifying the occurrence of errors: items 5, 8 and 9 cover the error procedures themselves.

8 Although many implementations will be designed to reset on the errors covered by item 7, resetting is classed as optional in item 7 because implementations are free to initiate a restart, or to initiate clearing of a virtual call, at any time; some implementations, therefore, may exercise this freedom in situations where resetting would otherwise apply.

9 Initiation of resetting is optional: a) because of the considerations in Note 8 with respect to events internal to the packet layer; and b) because initiation of resetting on request from the higher-layer entity is intrinsically optional, in that an implementation could be designed for use specifically by a higher-layer entity that in turn is designed never to request resetting.

10 Although many implementations will be designed to reset a logical channel by responding to a reset, response to resetting is classed as optional because implementations are free to initiate restarting, or to initiate clearing of a virtual call, at any time; some implementations , therefore, may exercise this freedom in situations where resetting would otherwise apply.

Table 38 - Static conformance: required timers and retransmission counters

T20	Restart Request Response Timer	and	R20	Restart Request Retransmission Counter	M
T21	Call Request Response Timer				C.1
T22	Reset Request Response Timer	and	R22	Reset Request Retransmission Counter	C.2
T23	Clear Request Response Timer	and	R23	Clear Request Retransmission Counter	C.3
T24	Window Status Transmission Timer				C.4
T25	Window Rotation Timer	and	R25	Data Packet Retransmission Counter	C.5
T26	Interrupt Response Timer				C.6
T27	Reject Response Timer	and	R27	Reject Retransmission Counter	C.7
T28	Registration Request Response Timer	and	R28	Registration Request Retransmission Counter	C.8

Where: M = Mandatory C.n = Conditional, as follows:

C.1 = required if the DTE initiates Virtual Calls
C.2 = required if the DTE initiates resetting
C.3 = required if the DTE implements the Virtual Call service and initiates clearing
C.4 = required if the DTE implements the optional procedure for window status transmission, specified in 11.2.2
C.5 = required if the DTE implements either of the optional procedures relating to the receipt of window rotation information, specified in 11.2.1
C.6 = required if the DTE supports sending of Interrupt data
C.7 = required if the DTE supports the optional user facility for Packet Retransmission
C.8 = required if the DTE supports the optional user facility for On-line Facility Registration

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21.1.2 Options

A DTE that claims conformance to this International Standard is not required to:

a) send DIAGNOSTIC packets (3.3, second item (d); 11.1);

b) support any optional user facilities (clause 13);

c) support any optional CCITT-specified DTE facilities (clause 14);

d) transmit a specific value of the Q-bit in DATA packets (6.6);

e) support either the use of the D-bit, or the optional mechanism for negotiating use or non-use of the D-bit (6.3);

f) transmit specific diagnostic code values when originating restarting, clearing or resetting (tables 24 and 25; 12.2.3.1, 12.5.1, 12.6.1);

g) implement transient states r3, p3, p7, d3, j2;

h) transmit RNR packets (7.1.6);

j) implement any of the optional procedures relating to non-receipt of window rotation information (11.2.1, 11.2.2);

k) implement either of the non-standard alternative modes of recovery from receipt of out of sequence DATA packets (11.3 (b) and (c));

l) support Interrupt data transfer (6.8);

m) support transfer of user data in call setup and clearing packets (5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.5.1, 5.5.2);

n) support DATA packet transfer (clause 6);

p) support DATA packets with the M-bit set to 1 (6.4, 6.7);

q) transmit updated window rotation information (7.1.3);

r) transmit RR packets (7.1.5)

In items (b), (c), (e), (l), (m), (n) and (p) support refers to transmission and reception, independently.

NOTE — Non-support by a DTE of any of items (l) to (r), and to a lesser extent of item (d), would normally be appropriate only for an unusual and highly application-specific implementation; these items, although strictly optional, are generally expected to be part of the normal functionality of a DTE.

21.2 Protocol Implementation Conformance Statement

The supplier of a protocol implementation which is claimed to conform to this International Standard shall complete a copy of the PICS proforma provided in annex C, including the information necessary to identify fully both the supplier and the implementation.

21.3 Dynamic conformance

A DTE for which conformance to this International Standard is claimed shall exhibit external behaviour consistent with having implemented, for each function that the PICS states to be supported,

a) the corresponding Packet Layer procedures and
b) the encoding of any transmitted packets

as specified in the clauses to which the PICS proforma entry for the function refers, and using the Data Link Layer as specified in 3.3, clause 10, and 12.1.

4. Add a new normative annex C as follows.

Annex C *
(normative)

PICS Proforma

C.1 Introduction

The supplier of a protocol implementation which is claimed to conform to ISO/IEC 8208 : 1990 shall complete the following Protocol Implementation Conformance Statement (PICS) proforma.

A completed PICS proforma is the PICS for the implementation in question. The PICS is a statement of which capabilities and options of the protocol have been implemented. The PICS can have a number of uses, including use:

— by the protocol implementor, as a check-list to reduce the risk of failure to conform to the standard through oversight;

— by the supplier and acquirer – or potential acquirer – of the implementation, stated relative to the common basis for understanding provided by the standard PICS proforma;

— by the user – or potential user – of the implementation, as a basis for initially checking the possibility of interworking with another implementation (note that, while interworking can never be guaranteed, failure to interwork can often be predicted from incompatible PICSs);

— by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

C.2 Abbreviations and special symbols

C.2.1 Status symbols

M mandatory
O optional
O.*n* optional, but support of at least one of the group of options labelled by the same numeral *n* is required
X prohibited
pred: conditional-item symbol, including predicate identification: see C.3.4
¬ logical negation, applied to a conditional item's *predicate*

C.2.2 General abbreviations

LC logical channel
N/A not applicable
PICS Protocol Implementation Conformance Statement
PVC Permanent Virtual Circuit

C.2.3 Item references

PICS items dealing with related functions are identified by item references sharing the same initial letter or letter-pair (in capitals). There follow two lists of those initials, first in the order in which the items occur in the PICS proforma, and then in alphabetical order.

C.2.3.1 In order of occurrence

V permanent Virtual circuit or Virtual call service
E Environment: DTE/DCE or DTE/DTE; X.25 1988, 1984 or 1980
M Modulo 8 or Modulo 128 packet sequence numbers
RN Reference Number optional user facility

L Link layer interactions
P general Packet formatting
Z packet layer functions independent of logical channels (packets with LC identifier Zero)
S call Setup
SP call Setup Packets
DN D-bit Negotiation
C call Clearing
CP call Clearing Packets
RS ReSetting of logical channels
W error procedures (response to Wrong behaviour)
I Interrupt transfer
DS Data packet Sending
DR Data packet Receiving
DC Delivery Confirmation

Y cause and diagnostic code values (whY resets, etc., initiated)
O Observability of transient states
B X.25 (1980) interworking: Backward compatibility
N X.25 Network differences from ISO/IEC 8208

FS Facilities Sent during call setup and clearing
FR Facilities Received during call setup and clearing
GS reGistration facilities Sent
GR reGistration facilities Received

V parameter Values and ranges
T Timers
R Retransmission counts
LC Logical Channel ranges

***) Copyright release for PICS proformas**

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

A Additional information
X eXception information

C.2.3.2 In alphabetical order

A Additional information
B X.25 (1980) interworking: Backwards compatibility
C call Clearing
CP call Clearing Packets
DC Delivery Confirmation
DN D-bit Negotiation
DR Data packet Receiving
DS Data packet Sending
E Environment: DTE/DCE or DTE/DTE; X.25 1988, 1984 or 1980
FR Facilities Received during call setup and clearing
FS Facilities Sent during call setup and clearing
GR reGistration facilities Received
GS reGistration facilities Sent
I Interrupt transfer
L Link layer interactions
LC Logical Channel ranges
M Modulo 8 or Modulo 128 packet sequence numbers
N X.25 Network differences from ISO/IEC 8208
O Observability of transient states
P general Packet formatting
R Retransmission counts
RN Reference Number optional user facility
RS ReSetting of logical channels
S call Setup
SP call Setup Packets
T Timers
V permanent Virtual circuit or Virtual call service
V*n* parameter Values and ranges
W error procedures (response to Wrong behaviour)
X eXception information
Y cause and diagnostic code values (whY resets, etc., initiated)
Z packet layer functions independent of logical channels (packets with LC identifier Zero)

C.3 Instructions for completing the PICS proforma

C.3.1 General structure of the PICS proforma

The first part of the PICS proforma – Identification, C.4 – is to be completed as indicated with the information necessary to identify fully both the supplier and the implementation.

The main part of the PICS proforma is a fixed-format questionnaire divided into six major subclauses; these can be divided into further subclauses each containing a group of individual items. Answers to the questionnaire items are to be provided in the rightmost column, either by simply marking an answer to indicate a restricted choice (usually Yes or No), or by entering a value or a set or range of values. Note that there are some items where two or more choices from a set of possible answers can apply: all relevant choices are to be marked.

Each item is identified by an item reference in the first column; the second column contains the question to be answered; the third column contains the reference or references to the material that specifies the item in the main body of ISO/IEC 8208 : 1990. The remaining columns record the status of the item – whether support is mandatory, optional, prohibited or conditional – and provide the space for the answers: see also C.3.4 below. (Status is sometimes indicated by other means than a separate Status column: for example, where the same status applies to a whole group of items, as in C.8.1.)

A supplier may also provide, or can be required to provide, further information, categorized as either Additional Information or Exception Information. When present, each kind of further information is to be provided in a further subclause of items labelled A*i* or X*i* respectively for cross-referencing purposes, where *i* is any unambiguous identification for the item (e.g., simply a numeral): there are no other restrictions on its format and presentation.

A completed PICS proforma, including any Additional Information and Exception Information, is the Protocol Implementation Conformance Statement for the implementation in question.

NOTE — Where an implementation is capable of being configured in more than one way according, for example, to the items in C.5, a single PICS may be able to describe all such configurations. However, the supplier has the choice of providing more than one PICS, each covering some subset of the implementation's configuration capabilities, in case that makes for easier and clearer presentation of the information.

C.3.2 Additional Information

Items of Additional Information allow a supplier to provide further information intended to assist the interpretation of the PICS. It is not intended or expected that a large quantity will be supplied, and a PICS can be considered complete without any such information. Examples might be an outline of the ways in which a (single) implementation can be set up to operate in a variety of environments and configurations; or a brief rationale – based perhaps upon specific application needs – for the exclusion of features which, although optional, are nonetheless commonly present in implementations of the X.25 packet layer protocol.

References to items of Additional Information may be entered next to any answer in the questionnaire, and may be included in items of Exception Information.

C.3.3 Exception Information

It may occasionally happen that a supplier will wish to answer an item with mandatory or prohibited status (after any conditions have been applied) in a way that conflicts with the indicated requirement. No pre-printed answer will be found in the Support column for this: instead, the supplier shall write the missing answer into the Support column, together with an X*i* reference to an item of Exception Information, and shall provide the appropriate rationale in the Exception item itself.

An implementation for which an Exception item is required in this way does not conform to ISO/IEC 8208 : 1990.

NOTE — A possible reason for the situation described above is that a defect in this International Standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

C.3.4 Conditional status

C.3.4.1 Conditional items

The PICS proforma contains a number of conditional items. These are items for which the status – mandatory, optional or prohibited – that applies is dependent upon whether or not certain other items are supported.

In many cases, whether or not the item applies at all is conditional in this way, as well as the status when the item does apply.

Where a group of items is subject to the same condition for applicability, a separate preliminary question about the condition appears at the head of the group, with an instruction to skip to a later point in the questionnaire if the "Not Applicable" answer is selected. Otherwise, individual conditional items are indicated by one or more conditional symbols (on separate lines) in the Status column.

A conditional symbol is of the form "***pred***: *S*" where ***pred*** is a predicate as described in C.3.4.2 below, and *S* is one of the status symbols M, O, O.n or X.

If the value of the predicate in any line of a conditional item is true (see C.3.4.2), the conditional item is applicable, and its status is that indicated by the status symbol following the predicate: the answer column is to be marked in the usual way. If the value of a predicate is false, the Not Applicable (N/A) answer is to be marked in the relevant line. (Each line in a multi-line conditional item should be marked: at most one line will require an answer other than N/A.)

C.3.4.2 Predicates

A predicate is one of the following:

a) an item-reference for an item in the PICS proforma: the value of the predicate is true if the item is marked as supported, and is false otherwise; or

b) a predicate name, for a predicate defined elsewhere in the PICS proforma: see below; or

c) the logical negation symbol "¬" prefixed to an item-reference or predicate name: the value of the predicate is true if the value of the predicate obtained by omitting the "¬" symbol is false, and vice versa.

The definition for a predicate name is a boolean expression constructed by combining simple predicates, as at (a) or (b) above, using the boolean operators AND, OR and NOT, and parentheses, in the usual way. The value of such a predicate is true if the boolean expression evaluates to true when the item-references are interpreted as at (a) above.

Each item whose reference is used in a predicate or predicate definition is indicated by an asterisk in the Item column.

C.4 Identification

C.4.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation Name(s) and Version(s)	
Other information necessary for full identification – e.g., name(s) and version(s) of machines and /or operating systems; system names	

NOTES

1 Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

2 The terms Name and Version should be interpreted appropriately to correspond with a supplier's terminology (e.g., Type, Series, Model).

C.4.2 Protocol summary

Identification of protocol specification	ISO/IEC 8208 : 1990 ISO/IEC 8208 : 1990/Amd.1 : 1990
Identification of amendments and corrigenda to this PICS proforma which have been completed as part of this PICS	ISO/IEC 8208 : 1990/ Amd. : Corr. : Amd. : Corr. : Amd. : Corr. : Amd. : Corr. :
Have any Exception items been required (see C.3.3)? (The answer Yes means that the implementation does not conform to ISO/IEC 8208 : 1990)	No ☐ Yes ☐

Date of Statement	