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Information technology — Protocol for providing the connectionless–mode network service

Part 2 — Provision of the underlying service by an ISO/IEC 8802 subnetwork

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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.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC1. 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.

International Standard ISO/IEC 8473-2 was prepared by the Joint Technical Committee ISO/IEC JTC1, *Information technology*.

ISO/IEC 8473 consists of the following parts, under the general title *Information technology — Protocol for providing the connectionless–mode network service:*

— Part 1: Protocol specification

— Parts 2–*n*: Provision of the underlying service by specific types of subnetwork

Introduction

This is one of a set of International Standards produced to facilitate the interconnection of open systems. The set covers the services and protocols required to achieve such interconnection.

This International Standard is positioned with respect to other related International Standards by the layers defined in ISO/IEC 7498-1. In particular, it defines the way in which a local area network that conforms to ISO/IEC 8802 may be used as a subnetwork within the Network layer to provide the abstract underlying service with respect to which the protocol defined by ISO/IEC 8473-1 is specified.

In order to evaluate the conformance of a particular implementation of this protocol, it is necessary to have a statement of which of the protocol's capabilities and options have been implemented. Such a statement is called a Protocol Implementation Conformance Statement (PICS), as defined in ISO/IEC 9646-1. A PICS proforma, from which a PICS may be prepared for a specific implementation, is included in this International Standard as normative Annex A.

INTERNATIONAL STANDARD

INFORMATION TECHNOLOGY — PROTOCOL FOR PROVIDING THE CONNECTIONLESS–MODE NETWORK SERVICE: PROVISION OF THE UNDERLYING SERVICE BY AN ISO/IEC 8802 SUBNETWORK

1 Scope

This International Standard specifies the way in which the underlying service assumed by the protocol defined by ISO/IEC 8473-1 is provided by a subnetwork that conforms to ISO/IEC 8802 through the operation of a subnetwork dependent convergence function (SNDCF) as described in ISO/IEC 8648. The SNDCF specified by this International Standard may be used with any ISO/IEC 8802 compliant subnetwork that provides the logical link control sublayer interface service defined by ISO/IEC 8802-2.

This International Standard also provides the PICS proforma for this protocol, in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-1.

2 Normative references

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

ISO/IEC 7498-1 : 1994, *Information technology — Open Systems Interconnection — Reference Model: Basic Reference Model.*

ISO/IEC 8348 : 1992, *Information technology — Network service definition for Open Systems Interconnection.*

ISO/IEC 8648 : 1988, *Information processing systems — Open Systems Interconnection — Internal organization of the network layer.*

ISO/IEC TR 8802-1 : 1994, *Information processing systems — Data communications — Local area networks — Part 1: Overview of local area networks.*

ISO/IEC 8802-2 : 1990, *Information processing systems — Data communications — Local area networks — Part 2: Logical link control.*

ISO/IEC 9646-1 : 1991, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts.*

3 Definitions

3.1 Reference model definitions

This International Standard makes use of the following terms defined in ISO/IEC 7498-1:

a) network entity
b) Network layer
c) service
d) service data unit
e) protocol control information

3.2 Network layer architecture definitions

This International Standard makes use of the following terms defined in ISO/IEC 8648:

a) subnetwork
b) subnetwork dependent convergence protocol
c) subnetwork dependent convergence function
d) subnetwork access protocol

3.3 Network layer addressing definitions

This International Standard makes use of the following term defined in ISO/IEC 8348:

a) subnetwork point of attachment

3.4 Local area network definitions

This International Standard makes use of the following terms defined in ISO/IEC 8802-1:

a) local area network
b) logical link control
c) logical link control sublayer
d) media access control

4 Abbreviations

CLNP	connectionless-mode network protocol
LLC	logical link control
MAC	medium access control
PDU	protocol data unit
PICS	protocol implementation conformance statement
QoS	quality of service
SDU	service data unit
SN	subnetwork
SNDCF	subnetwork dependent convergence function
SNPA	subnetwork point of attachment
SNSDU	subnetwork service data unit
UI	unnumbered information

5 Subnetwork dependent convergence function

5.1 General model

The general model for providing the underlying service assumed by the protocol in conjunction with a real subnetwork that uses a connectionless subnetwork access protocol is as follows. The generation of an SN-UNITDATA Request by the CLNP results in the generation of a corresponding subnetwork-specific UNITDATA request by the subnetwork dependent convergence function. The receipt of a subnetwork-specific UNITDATA indication associated with delivery of a connectionless data unit to its destination causes the SNDCF to generate an SN-UNITDATA Indication to the CLNP.

The general model for providing the underlying service assumed by the CLNP in conjunction with a real subnetwork that uses a connection-mode subnetwork access protocol is as follows. The generation of an SN-UNITDATA Request by the CLNP causes a connection (logical channel, logical link, or the equivalent) to be made available for the transmission of SN-User-data. If a connection cannot be made available, the SN-UNITDATA Request is discarded. The receipt of subnetwork-specific PDUs containing SN-User-data causes the SNDCF to generate an SN-UNITDATA Indication to the CLNP.

Where a real subnetwork is designed to use either a connectionless-mode or a connection-mode subnetwork access protocol, the provision of the underlying service assumed by the CLNP is achieved by using the connectionless-mode alternative.

5.2 Subnetwork user data

The SN-User-data consists of an ordered multiple of octets, and is transferred transparently between the specified subnetwork points of attachment.

The underlying service assumed by the CLNP is required to support a service data unit size of at least 512 octets.

If the minimum service data unit sizes supported by all of the subnetworks involved in the transmission of a particular PDU are known to be large enough that segmentation is not required, then either the full protocol or the non-segmenting protocol subset may be used.

Data received from a subnetwork with protocol identification specifying the CLNP protocol (ISO/IEC 8473) shall be processed according to ISO/IEC 8473-1.

NOTE — Data with other protocol identification should be ignored, since it may have been sent by an implementation supporting additional protocols intended for use with this protocol.

5.3 Subnetwork dependent convergence functions used with ISO/IEC 8802 subnetworks

ISO/IEC 8802-2 describes two classes of logical link control (LLC). Class 1 provides an unacknowledged connectionless-mode service only. Class 2 provides both connectionless-mode and connection-mode services. For stations which conform to either of these two classes of service, the unacknowledged connectionless-mode service is used to provide the underlying service assumed by ISO/IEC 8473-1.

The unacknowledged connectionless-mode service described in ISO/IEC 8802-2 is precisely that required by the CLNP. This service, with the exception of QoS, is summarized in Table 1.

Primitive		Parameters
DL-UNITDATA	.Request .Indication	DL-Source-Address, DL-Destination-Address, DL-Priority, DL-Data

Table 1 — ISO/IEC 8802-2 LLC sublayer service primitives

Subnetwork dependent convergence functions perform a mapping of the unacknowledged connectionless-mode service provided by a LLC Class 1 or Class 2 subnetwork onto the underlying service assumed by the CLNP. The mapping is as follows. The generation of an SN-UNITDATA request by the CLNP results in a DL-UNITDATA request (as described in ISO/IEC 8802-2) being generated by the subnetwork dependent convergence function. A corresponding DL-UNITDATA indication prompts the SNDCF to generate an SN-UNITDATA indication to the CLNP. No explicit subnetwork dependent convergence protocol control information is exchanged between network entities to provide this mapping of service.

The addresses used in the SN-UNITDATA request and indication primitives are the seven-octet LAN station addresses described in ISO/IEC 8802-2, consisting of the six-octet medium access control (MAC) address plus the one-octet LLC service access point address.

NOTE — In order to provide the underlying service assumed by ISO/IEC 8473-1, the underlying service shall be able to support a minimum service data unit size of 512 octets. While no SDU size restriction is imposed by ISO/IEC 8802-2, the minimal requirement for a MAC is that it be capable of conveying unnumbered information (UI) PDUs containing 128 octets in the information field. The additional constraint is therefore imposed on the SNDCF in such circumstances that it be able to convey at least 512 octets of user data in UI PDUs.

Annex A[1]

PICS proforma

(This annex forms an integral part of this International Standard.)

A.1 Introduction

The supplier of a protocol implementation which is claimed to conform to this International Standard 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, as a detailed indication of the capabilities 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.

A.2 Abbreviations and special symbols

A.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 A.3.4)
^	logical negation, applied to a conditional item's predicate

A.2.2 Other symbols

<r>	receive aspects of an item
<s>	send aspects of an item

[1] Copyright release for PICS proformas

Users of this Recommendation | International Standard 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.

A.3 Instructions for completing the PICS proforma

A.3.1 General structure of the PICS proforma

The first part of the PICS proforma — Implementation Identification and Protocol Summary — 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 a number of 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 — There are some items for which two or more choices from a set of possible answers can apply. All relevant choices are to be marked in these cases.

Each item is identified by an item reference in the first column; the second column contains the question to be answered; and the third column contains the reference or references to the material that specifies the item in the main body of this International Standard. The remaining columns record the status of the item — whether support is mandatory, optional, prohibited, or conditional — and provide space for the answers (see also A.3.4).

A supplier may also 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., a number); there are no other restrictions on its format or 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, 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 cases where this makes for easier and clearer presentation of the information.

A.3.2 Additional information

Items of Additional Information allow a supplier to provide further information intended to assist in 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 this 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.

A.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 Information item itself.

An implementation for which an Exception Information item is required in this way does not conform to this International Standard.

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

A.3.4 Conditional status

A.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, or upon the values supported for other items.

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>:<x>" where "<pred>" is a predicate as described in A.3.4.2, and "<x>" 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 A.3.4.2), then 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.

A.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;

b) a predicate name, for a predicate defined elsewhere in the PICS proforma (usually in the Major Capabilities section or at the end of the section containing the conditional item): 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 formed by omitting the "^" is false, and vice versa.

The definition for a predicate name is one of the following

a) an item-reference, evaluated as at (a) above;

b) a relation containing a comparison operator (=, < , etc.) with at least one of its operands being an item-reference for an item taking numerical values as its answer; the predicate is true if the relation holds when each item-reference is replaced by the value entered in the Support column as an answer to the item referred to; or

c) a boolean expression constructed by combining simple predicates, as in (a) and (b), 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 simple predicates are interpreted as described above.

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

A.4 Identification

A.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 name(s))	

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).

A.4.2 Protocol summary

Identification of protocol specification	ISO/IEC 8473-2 : 1994
Identification of corrigenda and amendments to the PICS proforma	
Protocol version(s) supported	
Have any Exception Information items been required (see A.3.3)? YES ☐ NO ☐ (The answer YES means that the implementation does not conform to this Recommendation | International Standard)	

Date of statement	

A.5 Subnetwork dependent convergence functions for use with ISO/IEC 8802 subnetworks

A.5.1 Applicability

Clause A.5 is applicable to all implementations that claim conformance to this International Standard.

A.5.2 ISO/IEC 8802-2 SNDCF functions

Item	Function	Reference	Status	Support
S802SNUD	Is Subnetwork User Data of at least 512 octets transfered transparently by the SNDCF?	5.2	M	Yes[]
S802SNTD	Is Trasit Delay determined by the SNDCF prior to the processing of user data?		M	Yes[]

A.5.3 ISO 8802-2 SNDCF multilayer dependencies

Item	Dependency	Reference	Requirement	Values Supported
S802SSg-r	<r>Maximum SN data unit size (Rx)	5.2	>= 512	
S802SSg-t	<s>Maximum SN data unit size (Tx)	5.2	>= 512	