INTERNATIONAL STANDARDIZED PROFILE

ISO/IEC ISP 10608-1

First edition
1992-12-15

AMENDMENT 1
1998-08-01

Information technology — International Standardized Profile TAnnnn — Connection-mode Transport Service over Connectionless-mode Network Service —

Part 1:
General overview and subnetwork-independent requirements

AMENDMENT 1: Reference Optional Security Requirements — TAnnn

Technologies de l'information — Profil normalisé international TAnnnn — Service de transport en mode connexion sur le service de réseau en mode sans connexion —

Partie 1: Introduction générale et spécifications indépendantes du sous-réseau

AMENDEMENT 1: Exigences de sécurité optionnelle de référence — TAnnn

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Reference number
ISO/IEC ISP 10608-1:1992/Amd.1:1998(E)

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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 JTC 1. In addition to developing International Standards, ISO/IEC JTC 1 has created a Special Group on Functional Standardization for the elaboration of International Standardized Profiles.

An International Standardized Profile is an internationally agreed, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or a set of functions.

Draft International Standardized Profiles are circulated to national bodies for voting. Publication as an International Standardized Profile requires approval by at least 75 % of the national bodies casting a vote.

Amendment 1 to ISO/IEC ISP 10608-1 was prepared with the collaboration of

— Asia-Oceania Workshop (AOW);

— European Workshop for Open Systems (EWOS);

— Open Systems Environment Implementors' Workshop (OIW).

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Part 1:

General overview and subnetwork-independent requirements

AMENDMENT 1: Reference Optional Security Requirements -- TAnnn

Add new Clause:

7 Location of Optional Security Requirements

Additional requirements are specified in subsequent parts of ISO/IEC ISP 10608 for the provision of security services (e.g. confidentiality, integrity, authentication) with the communications services provided by the profiles defined in ISO/IEC ISP 10608. The provision of these security requirements is optional.

Optional requirements for provision of security services in a manner that is independent of the subnetwork employed are specified in:

ISO/IEC ISP 10608-7: [1], *Information technology -- International Standardized Profile Tannn -- Connection-mode Transport service over Connectionless-mode Network Service --Part 7: Security employing the Network Layer Security Protocol - Connectionless mode, for TAnnn profiles*

Note: An alternative set of security profile requirements, that are only applicable to profiles employing X.25 subnetworks but potentially provide additional protection (e.g. protection against replay attacks), is specified in:

ISO/IEC ISP 10608-8: [1], *Information technology -- International Standardized Profile Tannn -- Connection-mode Transport service over Connectionless-mode Network Service --Part 8: Security employing the Network Layer Security Protocol -- Connection-mode with SDT-PDU based protection over X.25 packet switched data networks using virtual calls, for TA1111 / TA1121 profiles*

This part is referenced normatively from Part 5 of ISO/IEC ISP 10608.

[1] To be published

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International Standardized Profile ISO/IEC ISP 10608-1 was prepared with the collaboration of

— OSI Asia-Oceania Workshop (AOW);

— European Workshop for Open Systems (EWOS);

— OSI Implementors Workshop (OIW).

ISO/IEC ISP 10608 consists of the following parts, under the general title *Information technology — International Standardized Profile TAnnnn — Connection-mode Transport Service over Connectionless-mode Network Service*:

— *Part 1: General overview and subnetwork-independent requirements*

— *Part 2: TA51 profile including subnetwork-dependent requirements for CSMA/CD Local Area Networks (LANs)*

— *Part 4: Definition of profile TA53 for operation over a Token Ring LAN subnetwork*

— *Part 5: TA1111/TA1121 profiles including subnetwork-dependent requirements for X.25 packet-switched data networks using vrtual calls*

— *Part 13: MAC sublayer and physical layer dependent requirements for Token Ring local area network*

Annexes A, B and C form an integral part of this part of ISO/IEC ISP 10608. Annexes D and E are for information only.

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Introduction

This part of ISO/IEC ISP 10608 (International Standardized Profile) is defined within the context of Functional Standardization, in accordance with the principles specified by ISO/TR 10000-1:1990. The context of Functional Standardization is one part of the overall field of Information Technology (IT) standardization activities, covering base standards, profiles, and registration mechanisms. A profile defines a combination of base standards that collectively perform a specific well-defined IT function. Profiles standardize the use of options and other variations in the base standards, and provide a basis for the development of uniform, internationally recognized system tests.

One of the most important roles for an ISP is to serve as the basis for the development (by organizations other than ISO and IEC) of internationally recognized tests and test centers. ISPs are produced not simply to legitimize a particular choice of base standards and options, but to promote real system interoperability. The development and widespread acceptance of tests based on this and other ISPs is crucial to the successful realization of this goal.

ISO/IEC ISP 10608 consists of several parts, of which this is Part 1. ISO/IEC 10608-1 specifies subnetwork-type independent requirements for Group TA profiles. ISO/IEC 10608-2 specifies subnetwork-type dependent requirements for Profile TA51. ISO/IEC ISP 10608-3 specifies subnetwork-type dependent requirements for Profile TA52. ISO/IEC ISP 10608-4 specifies subnetwork-type dependent requirements for Profile TA53. ISO/IEC ISP 10608-5 specifies subnetwork-type dependent requirements for Profiles TA1111 and TA1121.

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Information technology - International Standardized Profile TAnnnn - Connection-mode Transport Service over Connectionless-mode Network Service

Part 1: General overview and subnetwork-type independent requirements

1 Scope

This part of ISO/IEC ISP 10608 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. It specifies a combination of OSI standards, which collectively provide the Connection-mode Transport Service using the Connectionless-mode Network Service.

This part of ISO/IEC ISP 10608 is applicable to the provision of the Connection-mode Transport Service in end systems attached to any type of subnetwork from which the standardized Connectionless-mode Network Service can be made available.

Profiles of the Connection-mode Transport Service over Connectionless-mode Network Service are members of a single group, Group TA, and support a single transport class, i.e., Class 4.

2 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 10608. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this part of ISO/IEC ISP 10608 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents, is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and the CCITT maintains published editions of its current Recommendations.

ISO 8072:1986, *Information processing systems - Open Systems Interconnection - Transport service definition.*

(See also CCITT Recommendation X.214 -1988).

ISO/IEC 8073:1988, *Information processing systems - Open Systems Interconnection - Connection oriented transport protocol specification.*

(See also CCITT Recommendation X.224 -1988).

ISO/IEC 8073:1988 /Add.2: 1989, *Information processing systems - Open Systems Interconnection - Connection oriented transport protocol specification - Addendum 2: Class four operation over connectionless network service.*

ISO/IEC 8073:1988 /Amd.3: 1992, *Information processing systems - Open Systems Interconnection - Connection oriented transport protocol specification - Amendment 3: Protocol implementation conformance statement (PICS) proforma.*

ISO/IEC 8073: /Cor.1:1990, *Information processing systems - Open Systems Interconnection - Connection oriented transport protocol specification - Technical corrigendum 1.*

ISO/IEC 8073: /Cor.2:1990, *Information processing systems - Open Systems Interconnection - Connection oriented transport protocol specification - Technical corrigendum 2.*

ISO/IEC 8073: /Cor.4:1991, *Information processing systems - Open Systems Interconnection - Connection oriented transport protocol specification - Technical corrigendum 4.*

ISO/IEC 8073: /Cor.5:1991, *Information processing systems - Open Systems Interconnection - Connection*

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oriented transport protocol specification - Technical corrigendum 5.

ISO 8348: 1987, *Information processing systems - Data communications - Network service definition.*

(See also CCITT Recommendation X.213 - 1988).

ISO 8348: /Add.1: 1987, *Information processing systems - Data communications - Network service definition - Addendum 1: Connectionless-mode transmission.*

ISO 8348: /Add.2: 1988, *Information processing systems - Data communications - Network service definition - Addendum 2: Network layer addressing.*

ISO 8473: 1988, *Information processing systems - Data communications - Protocol for providing the connectionless-mode network service.*

3 Definitions

All of the terms used in this part of ISO/IEC ISP 10608 are defined either in the referenced base standards (see clause 2) or in the International Standards listed in annex E.

4 Abbreviations

All of the abbreviations and acronyms used in this part of ISO/IEC ISP 10608 are defined either in the referenced base standards (see clause 2) or in the International Standards listed in annex E.

5 Subnetwork-type Independent Requirements

5.1 General

The requirements stated in this clause apply uniformly to all conforming end systems, without regard to the type of subnetworks to which those end systems might be attached. Additional requirements apply to end systems according to the type of subnetworks to which they are attached; these requirements are specified in subsequent parts of ISO/IEC ISP 10608.

5.2 Transport Layer Requirements

This part of ISO/IEC ISP 10608 specifies provision of the connection-mode Transport Service, as defined in ISO 8072, using class 4 of the connection-mode Transport Protocol, as defined in ISO 8073 and ISO 8073/Add.2 which defines operation of class 4 over the connectionless-mode Network Service.

Additional requirements are given in annex A and C which define the IPRL for the Transport protocol. Annex B contains defect reports related to ISO/IEC 8073 along with the statement of any consequential requirements for implementors of these profiles.

5.2.1 Static conformance requirements

A conforming implementation shall

a) satisfy the conformance requirements as stated in clause 14 of ISO 8073.

b) support of the mandatory features for class 4 over CLNS as defined in ISO 8073 and ISO 8073/Add.2.

c) if it claims to be capable of initiating TC establishment, be capable of demonstrating the sending of a CR TPDU with

   1) class 4 as the preferred class.

d) if it claims to be capable of responding to TC establishment, be capable of demonstrating the acceptance of a CR TPDU with class 4 as the preferred class.

e) if it claims to be capable of initiating TC establishment, be capable of

   1) transmitting a Called TSAP-ID field in a CR TPDU,

   2) when necessary, transmitting a Calling TSAP-ID field in a CR TPDU that can convey any one of the Transport Selectors implemented by the system.

f) if it claims to be capable of responding to a TC establishment attempt, be capable of

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1) transmitting a Calling TSAP-ID field in a CC TPDU,

2) when necessary, transmitting a Called TSAP-ID field in a CC TPDU that can convey any one of the Transport Selectors implemented by the system.

g) be capable of configuring the initial values of the following parameters:

T1 Local retransmission time

N Maximum number of retransmissions

I Inactivity time

W Window time

h) if an implementation is operating any policy which delays the transmission of AK TPDUs, the maximum amount of time by which a single AK TPDU can be delayed shall be indicated to the remote transport entity using the acknowledge time parameter.

5.2.2 Dynamic conformance requirements

a) TSAP-ID

The implementation shall support remote TSAP-ID parameters of variable size up to and including 32 octets using any encoding and any value.

Local T-selectors shall not exceed 32 octets in length.

On receipt of a CR TPDU the absence of a Calling or a Called TSAP-ID parameter shall be treated as equivalent to a zero length Calling or Called TSAP-ID parameter.

The absence of the CC Calling TSAP-ID parameter on receipt indicates that the value of the CC Calling TSAP-ID parameter is equivalent to the value of the CR Calling TSAP-ID parameter.

The absence of the CC Called TSAP-ID parameter on receipt indicates that the value of the CC Called TSAP-ID parameter is equivalent to the value of the CR Called TSAP-ID parameter.

Figure 1 summarizes the handling of Called and Calling TSAP-ID parameters in CR and CC TPDUs.

		CR Called		
		no param	0 len	len>0
CC Called	no param	NIL	NIL	note 1
	0 len	NIL	NIL	Invalid
	len >0	Invalid	Invalid	note 2

		CR Calling		
		no param	0 len	len>0
CC Calling	no param	NIL	NIL	note 4
	0 len	NIL	NIL	Invalid
	len >0	Invalid	Invalid	note 3

Notes:

1 CC Called is equivalent to CR Called.
2 CC Called must match in length and value to CR Called.
3 CC Calling must match in length and value to CR Calling.
4 CC Calling is equivalent to CR Calling.

Figure 1 - Handling of Called and Calling TSAP-ID parameters

b) Option selection on connection establishment

A conforming implementation shall implement the "non-use of checksum" function. It is recommended that

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the initiator proposes the non-use of checksum.

c) Invalid values in known parameters

Known parameters with invalid lengths in a CR or CC TPDU shall be handled as a protocol error.

Known parameters with valid lengths but invalid values in a CR TPDU shall be handled as follows:

Parameter	Action
Called TSAP-ID	send DR TPDU.
Checksum	discard CR TPDU.

5.3 Network Layer requirements

ISO/IEC ISP 10608 specifies provision of the connectionless-mode Network Service, as defined by ISO 8348 and ISO 8348/Add.1, using the connectionless-mode Network Protocol as defined by ISO 8473.

ISO/IEC ISP 10608 specifies the use of OSI network addresses according to ISO 8348/Add.2. Any NSAP address, in any of the formats identified by ISO 8348/Add.2, may be used with ISO 8473.

ISO/IEC ISP 10608 specifies the use of an ES-IS protocol for the exchange of routing information between end systems and intermediate systems attached to the same subnetwork. Since the implementation of the ES-IS protocol varies from subnetwork to subnetwork, reference to a specific base standard will be found in the subnetwork-type dependent parts of ISO/IEC ISP 10608.

Additional requirements are given in Annex C which defines the IPRL for the Network Layer protocol.

5.3.1 CLNP requirements

5.3.1.1 Inactive subset

An implementation shall not transmit PDUs encoded using the inactive subset. Received PDUs encoded using the inactive subset may be discarded.

5.3.1.2 Non-segmenting subset

An implementation shall not generate data PDUs without a segmentation part. However, an implementation shall receive and correctly process PDUs which do not contain the segmentation part to provide interoperability with those systems that have chosen to transmit PDUs without a segmentation part, i.e., the segmentation permitted flag set to zero.

5.3.2 ES-IS requirements

Additional subnetwork dependent requirements for the ES-IS protocol are defined in subsequent (subnetwork dependent) parts of ISO/IEC ISP 10608.

6 Location of subnetwork-type specific requirements

Additional requirements that apply to end systems according to the type(s) of subnetwork to which they are attached are specified in subsequent parts of ISO/IEC ISP 10608. The subnetwork-type specific requirements concern both the way in which specific subnetwork services are provided by individual real subnetworks and the way in which those specific subnetwork services are used to provide the underlying service assumed by ISO 8473.

The following part numbers have been assigned in the expectation that they will be produced in the foreseeable future.

Part 2	TA51 - CSMA/CD LAN
Part 3	TA52 - Token Bus LAN
Part 4	TA53 - Token Ring LAN
Part 5	TA1111/TA1121 - X.25 subnetwork.

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Annex A
(normative)
International Standardized Profile Implementation Conformance Statement Requirements List (IPRL)

A.1 Introduction

The IPRL in this annex specifies the additional requirements for ISO 8073/Amd.3. The requirements of ISO 8073/Amd.3 apply to each item for which there is no entry in this IPRL.

The IPRL in this annex follows the proforma specified in ISO 8073/Amd.3. Since the TA profile group uses the transport protocol Class 4 exclusively, the items of the PICS for Classes 0 through 3 and Class 4 over CONS do not need to be duplicated in the IPRL for the TA profiles. All references to transport classes 1 through 3 and Class 4 over CONS are out of the scope of ISO/IEC ISP 10608.

A conforming implementation shall satisfy the mandatory conformance requirements of the base standard referenced in this part of the profile.

A.2 Notation

The following tables define the functions supported for which conformance is claimed, using the following keys.

a) Base standard status notation

1) base standard type or range

M	; mandatory.
O	; optional.
O.<n>	; optional, but support of at least one of the group of options labeled by the same numeral <n> is required.
<index>:	; this predicate symbol means that the status following it applies only when the PICS states that one or more of the items identified by the index is supported. In the simplest case, <index> is the identifying tag of a single PICS item. <index> may also be a Boolean expression composed of several Indices.
<index>::	; When this group predicate is true the associated clause should be completed.

b) IPRL status notation

The Status column of Profile features entries use a one character or a two character notation. A one character notation indicates the static requirements only. If a two character notation is used, the first character is the static requirement and the second character is the dynamic requirement.

1) static

m	; Mandatory, mandatory to be implemented.
i	; Out of scope, not relevant to this profile.

2) dynamic

m	; Mandatory (use is mandatory)

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A.3 Transport Layer IPRL

A.3.1 NCMS functions

Base Standard Features				Profile Features	
Index	Feature	References	Status	ISP References	Status
N2	Network connection management	6.3.1	O		i
N3	Diagnostic	7.6.2, 7.7	O		i
N4	Active network connection recovery	7.4.2	O		i

A.3.2 Supported functions in Class 4 (C4 or C4L::)

Base Standard Features				Profile Features	
Index	Feature	References	Status	ISP References	Status
T4F29	Non-use of checksum	6.17	O	5.2.2 b)	m

A.3.3 Supported parameters of issued TPDUs

A.3.3.1 Supported parameters for NCMS (A1::)

A.3.3.2 UN TPDU (SN1::)

Base Standard Features				Profile Features	
Index	Supported parameters	References	Values allowed	ISP References	Status
IU1	Protocol Identifier	8.3.3 b)	ISO8073,ISO8602,Private		ISO8073

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A.3.3.3 Supported parameters for class 4 TPDUs (C4 or CL4::)

Base Standard Features				Profile Features	
Index	Supported parameters	Clause of Base Std.	Status	Clause of ISP	Status
I4CR7	Called TSAP ID	13.3.4 a)	O		m
I4CR11	Protection parameters	13.3.4 d)	O		i
I4CR12	Additional option selection	13.3.4 f)	O		m
I4CR13	Throughput	13.3.4 j)	O		i
I4CR14	Residual error rate	13.3.4 k)	O		i
I4CR15	Priority	13.3.4 m)	O		i
I4CR16	Transit delay	13.3.4 n)	O		i
I4CC7	Calling TSAP ID	13.4.4	O		m
I4CC9	Protection parameters	13.4.4	O		i
I4CC10	Additional option selection	13.4.4	O		m
I4CC12	Throughput	13.4.4	O		i
I4CC13	Residual error rate	13.4.4	O		i
I4CC14	Priority	13.4.4	O		i
I4CC15	Transit delay	13.4.4	O		i
I4DR4	Additional information	13.5.4 a)	O		i

A.3.4 Protocol Implementation

A.3.4.1 Classes Implemented

Base Standard Features				Profile Features	
Index	Feature	References	Status	ISP References	Status
C4L	Class 4 operation over CLNS	14	ISO:C2:O		m

A.3.4.2 Class negotiation - responder side

Base Standard Features				Profile Features	
Index	Feature	References	Allowed Responses	ISP References	Status
RC4	What classes can you respond with if CR proposes only class 4	6.5.4 h) Table 3	2,4 or conn. refused depending on classes supported		4

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Annex B
(normative)
List of defect reports

B.1 Introduction

Defect reports which affect technical contents of ISO/IEC 8073, its amendments, and technical corrigenda (see clause 2) are listed in this annex. These defect reports are generated and authorized by ISO/IEC JTC1/SC6, but not yet published as a technical corrigendum. The defect reports in this annex are included because they contain relevant information about the significance and requirements of the base standard. Implementations shall conform to the base standard amended as proposed in these defect reports.

1. Defect Report Number: 8073/53

8. Qualifier: Technical

9. Reference in Document: subclause 12.2.4.2

10. Nature of Defect:

    Applying the retransmission procedure to the release phase may lead to opening a new network connection for retransmitting a DR. It should also be possible in this case to release the transport connection.

11. Solution Proposed by the Source:

    Append to 12.2.4.2 the following:

    "NOTE - Although the retransmission procedure also applies to the DR TPDU in the release phase, it is however possible to consider that the transport connection has been released if it would be necessary to open a new network connection for retransmitting the DR TPDU".

12. Editor's Response:

    Append to 12.2.4.2 the following:

    "Although the retransmission procedure also applies to the DR TPDU in the release phase, the transport entity may however consider that the transport connection has been released if it would be necessary to open a new network connection in order to retransmit the DR TPDU".

1. Defect Report Number: 8073/64

8. Qualifier: Technical

9. Reference in Document: subclause 6.1.3, paragraph 3 and 5

10. Nature of Defect:

    Clarification associated with Defect Report 8073/63.

11. Solution Proposed by the Source: See item 12

    Subclause 6.1.3, paragraph 3:

    Replace the term "a transport entity" with the term "the initiator".

    Subclause 6.1.3, paragraph 5 - add the following sentence to c):

    "In this case, both initiator and responder become aware of the assignment".

12. Editor's Response:

    In subclause 6.1.3, paragraph 3:

    Replace the term "a transport entity" with the term "the initiator".

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Annex C
(normative)
International Standardized Profile Implementation Conformance Statement Requirements List (IPRL)

C.1 Introduction

The IPRL in this annex specifies the additional requirements for ISO 8473. The requirements of ISO 8473 apply to each item for which there is no entry in this IPRL.

The IPRL in this annex is based on the working draft of the proforma that has not yet been reviewed by the cognizant ISO technical committee.

This IPRL specifies full implementation of the Connectionless-mode Network Protocol for end systems. Neither of the two subsets identified in ISO 8473 is relevant. Intermediate system operation is not specified.

A conforming implementation shall satisfy the mandatory conformance requirements of the base standard referenced in this part of the profile.

C.2 Notation

The following tables define the functions supported for which conformance is claimed, using the following keys.

a) Base standard status notation

1) base standard type or range

M	; mandatory.
O	; optional.
-	; not applicable.
O.<n>	; optional, but support of at least one of the group of options labeled by the same numeral <n> is required.
<index>:	; this predicate symbol means that the status following it applies only when the PICS states that one or more of the items identified by the index is supported. In the simplest case, <index> is the identifying tag of a single PICS item. <index> may also be a Boolean expression composed of several Indices.
<index>::	; When this group predicate is true the associated clause should be completed.

b) IPRL status notation

The Status column of Profile Features is entered up by the one character or the two character notation. The one character notation indicates the static requirements only. For the two character notation the first character is the static requirements and the second character is the dynamic requirements.

1) static

m	; Mandatory, mandatory to be implemented.
i	; Out of scope, not relevant to this profile.
o	; Optional, optional to be implemented.

2) dynamic

m	; Mandatory (use is mandatory)
x	; Excluded (use is prohibited within the context of this profile)

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C.3 Connectionless-mode IPRL

NOTE - This IPRL includes an interim version of the PICS proforma. When a standardized PICS proforma is published, this IPRL will refer to it.

C.3.1 Supported NPDUs

The following NPDUs are the only ones used.

Base Standard Features				Profile Features	
Index	NPDUs	Reference	Status	ISP Reference	Status
	DT transmit	7.7	M		&
	DT receive	7.7	M		&
	ER transmit	7.9	M		&
	ER receive	7.9	M		&

C.3.2 Supported subsets

The supplier should indicate in the PICS proforma any support of the following subsets.

Base Standard Features					Profile Features		
Index	Protocol Subsets	Reference	Status		ISP Reference	Status	
			DT	ER		DT	ER
	Inactive subset transmit	7.8	O	-	5.3.1	ox	&
	Inactive subset receive	7.8	O	-	5.3.1	i	&
	Non-segmenting subset transmit	7.4	O	-	5.3.1	ox	&
	Non-segmenting subset receive	7.4	O	-	5.3.1	mm	&

&: same as base standard

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C.3.3 Supported functions

The supplier should indicate in the PICS proforma support of the following functions.

Base Standard Features - transmission					Profile Features		
Index	Protocol functions transmitted	Reference	Status		ISP Reference	Status	
			DT	ER		DT	ER
	PDU composition	6.1	M	M		&	&
	Route PDU	6.5	M	M		&	&
	Forward PDU	6.6	M	M		&	&
	Segmentation	6.7	M	-		&	&
	Error reporting	6.10	O	-		&	&
	PDU header error detection	6.11	O	O		&	&
	Congestion notification	6.18	O	O		&	&

Base Standard Features - reception					Profile Features		
Index	Protocol functions received	Reference	Status		ISP Reference	Status	
			DT	ER		DT	ER
	PDU decomposition	6.2	M	M		&	&
	Header format analysis	6.3	M	M		&	&
	PDU lifetime control	6.4	O	O		&	&
	Reassembly	6.8	M	-		&	&
	Discard PDU	6.9	M	M		&	&
	Error reporting	6.10	M	-		&	&
	PDU header error detection	6.11	M	O		&	&
	Congestion notification	6.18	O	O		&	&

&: same as base standard

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C.3.4 Supported parameters

The supplier should indicate in the PICS proforma support of the following parameters.

Base Standard Features - transmission					Profile Features		
Index	Protocol parameters transmitted	Reference	Status		ISP Reference	Status	
			DT	ER		DT	ER
	Padding	7.5.2	O	O		&	&
	Security	7.5.3	O	O		i	i
	Reason for discard	7.9.1.4	-	M		&	&
	Partial source routing	7.5.4	O	O		ox	ox
	Complete source routing	7.5.4	O	O		ox	ox
	Partial route recording	7.5.5	O	O		&	&
	Complete route recording	7.5.5	O	O		ox	ox
	QoS maintenance	7.5.6	O	O		i	i
	Priority	7.5.7	O	O		i	i

Base Standard Features - reception					Profile Features		
Index	Protocol parameters received	Reference	Status		ISP Reference	Status	
			DT	ER		DT	ER
	Padding	7.5.2	O	O		&	&
	Security	7.5.3	O	O		i	i
	Reason for discard	7.9.1.4	-	M		&	&
	Partial source routing	7.5.4	O	O		i	i
	Complete source routing	7.5.4	O	O		i	i
	Partial route recording	7.5.5	O	O		i	i
	Complete route recording	7.5.5	O	O		i	i
	QoS maintenance	7.5.6	O	O		i	i
	Priority	7.5.7	O	O		i	i

NOTE - QoS maintenance is mandatory (mm) if a system supports the Congestion Notification function.

&: same as base standard

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Annex D
(informative)
Recommendations on Transport Layer Interoperability

D.1 Transport Layer Recommendations

The following recommendations apply to the Transport Layer for all profiles defined in this part of ISO/IEC ISP 10608. They should enhance the likelihood of interoperability if followed.

D.1.1 Retransmission timer

It is recommended that the value used for the retransmission timer be based upon the round-trip delay experienced on a transport connection. The implementation should maintain, and continually update, an estimate of the round-trip delay for the transport connection. From this estimate, a value for the retransmission counter is calculated each time it is started. An example of a technique for maintaining the estimate and calculating the retransmission time is described below. The value of the retransmission time may be calculated according to the following formula;

$$t1 \leftarrow k\,E + w$$

in this formula, **E** is the current estimate of the round-trip delay on the transport connection, **w** is the value of the acknowledgment time parameter received from the remote transport service provider during connection establishment, and **k** is some locally administered factor.

A value for **k** should be chosen to keep the retransmission timer sufficiently small such that lost TPDUs will be detected quickly, but not so small that false alarms are generated, causing unnecessary retransmission.

The value of **E** may be calculated using an exponentially weighted average based upon a regular sampling of the interval between transmitting a TPDU and receiving the corresponding acknowledgment. Samples are taken by recording the time-of-day when a TPDU requiring acknowledgment is transmitted and calculating the difference between this time and the time-of-day when the corresponding acknowledgment is received. New samples are incorporated with the existing average according to the following formula;

$$E \leftarrow E + (1 - \alpha)\,(S - E)$$

in this formula, **S** is the new sample and α is a parameter which can be set to some value between 0 and 1. The value chosen for α determines the relative weighting placed upon the current estimate and the new sample. A large value of α weights the old estimate more heavily causing it to respond only slowly to variations in the round-trip delay.

A small value for α weights the new sample more heavily causing a quick response to variations. Note that setting α to 1 will effectively disable the algorithm and result in a constant value for **E**, being that of the initial seed.

If α is set to $1-2^{-n}$ for some value of **n**, the update can be reduced to a subtract and shift as shown below.

$$E \leftarrow E + 2^{-n}\,(S - E)$$

When sampling, if an AK TPDU is received which acknowledges multiple DT TPDUs, only a single sample should be taken, being the round-trip delay experienced by the most recently transmitted DT TPDU. This attempts to minimize, in the sample, any delay caused by the remote transport service provider withholding AK TPDUs.

D.1.2 Keep-alive function

The Class 4 protocol detects a failed transport connection by use of an *inactivity timer*. This timer is reset each time a TPDU is received on a connection. If the timer ever expires, the connection is terminated.

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The Class 4 protocol maintains an idle connection by periodically transmitting an AK TPDU upon expiration of the *window timer*. Thus, in a simple implementation, the interval of one transport entity's window timer must be less than that of its peer's inactivity timer, and vice versa. The mechanism described below can be used if it is known that the remote implementation always responds to the receipt of a duplicate AK TPDU not containing flow control confirmation by transmitting an AK TPDU containing the flow control confirmation parameter. It avoids the need to know the remote implementation's timer values.

- Implementations must always transmit duplicate AK TPDUs without flow control confirmation on expiration of the local window timer - ISO 8073, clause 12.2.3.8.1. Receipt of this TPDU by the remote transport entity will cause it to respond with an AK TPDU containing the flow control confirmation parameter. When this is received by the local transport entity, it will reset its inactivity timer - see figure D.1.
- It is a local matter for an implementation to set the intervals of its timers to appropriate relative values, specifically;
  - The window timer must be greater than the round-trip delay,
  - The inactivity timer shall be greater than two times the window timer and should normally be an even greater multiple if the transport connection is to be resilient to the loss of an AK TPDU.

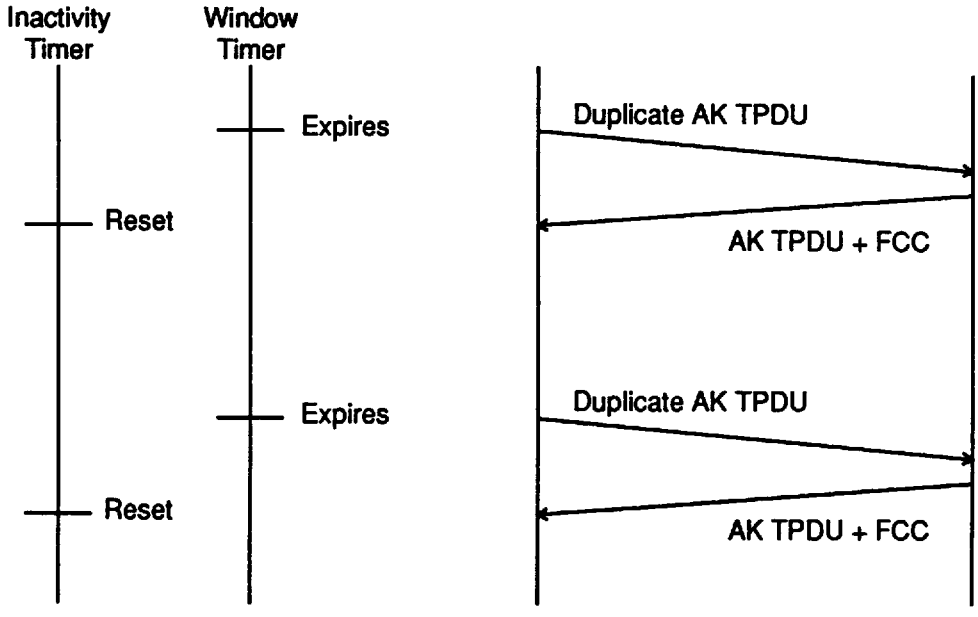

Figure D.1 AK TPDU exchange on an idle connection

A duplicate AK TPDU (see figure D.1) is one which contains the same values for YR-TU-NR, credit, and subsequence number as the previous AK TPDU transmitted. A duplicate AK TPDU does not acknowledge any new data, nor does it change the credit window.

D.1.3 Version number

The version number parameter should never be transmitted in the CR TPDU. If for some reason the version number is to be transmitted in the CR TPDU, its value should be set to one.

D.1.4 Extended numbering

In all TA5n profiles, implementations are strongly recommended to support the extended numbering option in the CR TPDU.

In high speed networks such as the 10 Mbit/s CSMA-CD LAN (TA51 profile), a number of testings and im-

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plementations have shown the need for use of the extended numbering option to obtain adequate performance.

D.1.5 Congestion avoidance mechanism

The following is one of several possible ways to implement a congestion avoidance mechanism. Whichever mechanism a system implements is a local matter.

This section defines optional requirements relating to avoiding congestion in OSI networks and for recovering from congestion when it is experienced. These optional requirements specify a dynamic window sizing scheme which, if implemented, will contribute further to the avoidance of congestion in the network.

For systems implementing this optional dynamic window sizing scheme the following rules apply as described below.

Receiving transport entity (RTE) rules.

Rule 1: Initializing of window

The initial value of *WR* (known as *WR0*) shall have a locally configurable upper bound. This window is sent to the sending transport entity (STE) in the next CDT field transmitted.

Rule 2: Required sampling period

All RTEs shall maintain a fixed value for *WR* until the next 2*WR* DT TPDUs arrive since the last CDT field was transmitted by the RTE.

Rule 3: Required counting of received TPDUs in a sampling period

All RTEs shall maintain a count, *N*, equal to the total number of TPDUs received, and a count, *NC*, equal to the total number of TPDUs received in NPDUs which had the Congestion Experienced (CE) flag set. All types of TPDUs are included in the counts for *N* and *NC*, not just DT TPDUs.

Rule 4: Required action at the end of a sampling period

All RTEs shall take the following action at the end of each sampling period:

- if the count *NC* is less than fifty percent of the count *N*, the RTE shall increase *WR* by adding 1 up to a maximum, *WR1*, that is based on a local buffer management policy. Otherwise it shall decrease *WR* by multiplying it by 0.875 (to a minimum of 1).
- Reset *N* and *NC* to zero.
- Transmit the new window *WR* in the next CDT field sent to the sending transport entity.

Sending transport entity (STE) rules.

Rule 1: Initializing of window

All STEs shall maintain a sending window size (*WS*). Initially and also as long as there is no loss, *WS* is set equal to the receiving window value *WR* received from the remote RTE in the last CDT field.

Rule 2: Required action on a timeout

All STEs shall reset *WS* to one when the retransmission timer expires and indicates a lost TPDU. *WS* now limits the number of DT TPDUs that may be transmitted or retransmitted without further acknowledgments.

Rule 3: Required counting of acknowledged TPDUs

All STEs shall maintain a count, ACKRCVD, of the number of DT TPDUs acknowledged by the RTE since *WS* was last adjusted. Therefore each time *WS* is adjusted, the count ACKRCVD shall be reset to zero.

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Rule 4: Increase window policy

All STEs shall increase *WS* by one each time ACKRCVD is equal to or greater than the current value of *WS*, unless *WS* exceeds the window permitted by the remote RTE.

D.2 Network Layer Recommendations

D.2.1 CLNP

In an implementation of ISO 8473 the PDU lifetime parameter should be given an initial value of at least three times the network span or three times the maximum transit delay (in units of 500 ms), whichever is greater.

The inactive subset of the CLNP has been defined as outside the scope of this profile, however, it is strongly recommended that the full CLNP profile be used in all cases. It is recommended that the inactive subset neither be used nor implemented.

D.2.2 ES-IS

Use or non-use of checksums should be configurable. It is recommended that checksums *not* be generated when originating ES-IS PDUs.

The ES-IS protocol should be primarily responsible for updating the Network Layer Routing Information Base (RIB). In addition, a management mechanism capable of adding and deleting *static* entries into or from the RIB is recommended. When using the mechanism to add an entry, there should be no holding timer, and the entry should be write protected from alteration by the ES-IS protocol.

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Annex E
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Bibliography

This annex contains references to ISO standards that provide useful information beyond that which is available from the directly referenced standards identified in clause 2.

ISO 8648:1988, *Information processing systems - Open Systems Interconnection - Internal organization of the Network Layer.*

ISO 8880-1:1990, *Information technology - Telecommunications and information exchange between systems - Protocol combinations to provide and support the OSI Network Service, Part1: General principles.*

ISO 8880-3:1990, *Information technology - Telecommunications and information exchange between systems - Protocol combinations to provide and support the OSI network service, part3: Provision and support of the connectionless-mode Network Service.*

ISO/IEC TR 9575:1990, *Information processing systems - Telecommunications and information exchange between systems - OSI routeing framework.*

ISO/IEC TR 9577:1990, *Information processing systems - Telecommunications and information exchange between systems - Protocol identification in the network layer.*

ISO/IEC 9646-1:1991, *Information processing systems - OSI Conformance testing methodology and framework - Part 1: General concepts.*

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