INTERNATIONAL STANDARD

ISO/IEC 8073

Information processing systems — Open Systems Interconnection — Connection oriented transport protocol specification

ADDENDUM 2: Class four operation over connectionless network service

Systèmes de traitement de l'information — Interconnexion de systèmes ouverts — Protocole de transport en mode connexion

ADDITIF 2 : Fonctionnement de la classe 4 sur le service de réseau en mode sans connexion

ISO/IEC 8073 : 1988/Add.2 : 1989 (E)

Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) together form a system for worldwide standardization as a whole. 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 approval before their acceptance as International Standards. They are approved in accordance with procedures requiring at least 75 % approval by the national bodies voting.

International Standard ISO/IEC 8073/Add.2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Information processing systems — Open Systems Interconnection — Connection oriented transport protocol specification

ADDENDUM 2: Class four operation over connectionless network service

0   Introduction

ISO/IEC 8073 specifies the connection-oriented Transport Protocol that provides the Transport Service as described in ISO 8072. This Transport Protocol uses the connection-oriented services provided by the Network Layer as specified in ISO 8348.

This addendum adds to ISO/IEC 8073 the ability to provide the connection-mode transport service using the connectionless-mode Network Service (ISO 8348/Add. 1) based upon class 4 procedures. The addendum has a structure which is similar to that of ISO/IEC 8073 in order to facilitate cross reference between the two documents and the eventual incorporation of this addendum into ISO/IEC 8073. Table numbering from ISO/IEC 8073 has been retained in the addendum in order to maintain alignment with ISO/IEC 8073 and for re-use of reference. Clause and sub-clause references in the text of ISO/IEC 8073 should be considered, in the context of the application of this addendum, to refer to the corresponding clauses and sub-clauses of this addendum, where they exist.

Except where a variation is specified in this addendum, the procedures specified in ISO/IEC 8073 for class four operation over the connection-oriented Network Service apply also to operation over the connectionless Network Service. General references in ISO/IEC 8073 to the Network Service and to ISO 8348 should be considered to be extended to embrace the connectionless Network Service as specified in ISO 8348/Add. 1. General references to a network connection should be considered to be extended to refer to the existing association between a pair of NSAPs over which a transport connection is established or being established.

ISO 7498 describes the Basic Reference Model of Open Systems Interconnection. It is the intention of the International Standard that the Reference Model should establish a framework for coordinating the development of existing and future standards for the interconnection of open systems.

The relationship between connection-oriented transmission and connectionless-mode transmission is defined in ISO 7498/Add. 1.

In the following clauses, two fonts are used to distinguish between instructions (for incorporating this addendum into ISO/IEC 8073) and original or replacement text.

- *This italic font is used for instructions and titles in reference clause 2,*

- while this sans serif font is used for original or replacement text.

1   Scope and field of application

Modify the first item, "a) five classes of procedures:" *to read* "a) five classes of procedure when operating over the connection oriented Network Service:".

Add a new item, "b) one class of procedure when operation over the connectionless Network Service:".

Re-label the original items b) and c) as items c) and d).

This addendum specifies the use of only a single class of procedures, class 4, for the connection-oriented transfer of data control information from one transport entity to a peer transport entity, over the connectionless network service.

2   References

Add the following references:

ISO 7498/Add. 1,   *Information processing systems – Open Systems Interconnection – Basic Reference Model – Addendum 1: Connectionless-mode transmission.*

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

Section one : General

3 Definitions

This addendum makes use of the definitions specified in clause 3 of ISO/IEC 8073, with the following qualifications:

a) *Add to sub-clause 3.1 after* "ISO 7498", "and ISO 7498/Add. 1".

b) *Add a new item to sub-clause 3.1,* "f) connectionless mode transmission".

c) *Add to end of sub-clause 3.2.28* **owner (of a network connection),** "Only applicable when operating over the connection-oriented Network Service."

d) *Add as sub-clause 3.2.30 the following additional definition:*
connectionless network service: A network service providing connectionless mode transmission.

4 Symbols and abbreviations

Add to sub-clause 4.5 the following symbols and abbreviations:

CLNS   Connectionless network service
CONS   Connection-oriented network service

5 Overview of the transport procotol

5.1 Service provided by the transport layer

5.2 Service assumed from the network layer

Add to "ISO 8348", "and ISO 8348/Add. 1".

Add "When operating over CONS," *to the beginning of the paragraph which starts,* "Information is transferred".

Modify "Table 2: Network service primitives" *to* "Table 2a) - Network service primitives of CONS".

Add the following text after the second paragraph:

When operating over CLNS, information is transferred to and from the NS-provider in the network service primitive listed in table 2b) below:

Add the following table after table 2a):

<p align="center">Table 2b) – Network service primitives of CLNS</p>

Primitives	X	Parameters	X
N-UNITDATA request	X	Source Address	X
	X	Destination Address	X
		Quality of service	X
		NS-user-data	X
indication	X	Source Address	X
	X	Destination Address	X
		Quality of service	X
		NS-user-data	X

<p align="center">X : The transport protocol assumes that this facility is provided in all networks.</p>

NOTES

1   The parameters listed in this table are those in the current connectionless Network Service (ISO 8348/Add. 1).

2   The way the parameters are exchanged between the transport entity and the network service provider is a local matter.

5.3   Functions of the transport layer

Add "only when operating over CONS," *to sub-clause 5.3.1.1, item b),* "multiplexing and demultiplexing" *after the phrase,* "a function".

Add "only when operating over CONS," *to sub-clause 5.3.1.2, item b),* "decide whether to multiplex" *after the phrase,* "a single network connection".

Replace sub-clause 5.3.1.3, item c), with the following text:

"splitting and recombining (see 6.23): a function allowing. only when operating over CONS, the simultaneous use of two or more network connections to support the same transport connection;".

5.4   Classes and options

Re-title sub-clause 5.4 as "**5.4   Classes and options when operating over CONS**".

Re-number sub-clause 5.5, "**Model of the transport layer**" *as sub-clause 5.6, and add the following text as the new sub-clause 5.5:*

5.5   Characteristics of class 4 transport protocol when operating over CLNS

In operation over a connectionless network service the class 4 transport procotol provides flow control between communicating peer transport entities, the capability to detect and recover from errors which occur as a result of a low grade of service available from the NS-provider, and resilience from failure of the peer entity. The kinds of error to be detected include: TPDU loss, TPDU delivery out of sequence, TPDU duplication and TPDU corruption. These errors may affect control TPDUs as well as data TPDUs.

> NOTE –   The transport entity is incapable of distinguishing between failure of the network service and failure of the peer entity. except optionally. by some local means, in the case of the failure of the local interface to the network service (e.g.. in the failure of the local transceiver on a local area network).

There is no indication given to the transport entity about the ability of the network entity to fulfill the service requirements given in the N-UNITDATA primitive. However, it can be a local matter to make transport entities aware of the availability and characteristics (QOS) of connectionless network services, as the corresponding NSAP associations, exist logically by the nature of the connectionless network service and may be recognized by network entities.

5.6   Model of the transport layer

Add "and ISO 8348/Add. 1" *after,* "see ISO 8348".

Section two : Transport protocol specification

6 Elements of procedure

6.1 Assignment to network connection

Re-title sub-clause 6.1 as "6.1   Use of the network service".

Add the following title and text as the new sub-clause 6.1.1:

6.1.1   Assignment to network connection when operating over CONS

This procedure is used only when operating over the connection-oriented network service.

Re-number sub-clauses 6.1.n as 6.1.1.n, respectively.

Add the following title and text as the new sub-clause 6.1.2:

6.1.2   Transmission over CLNS

This procedure is used only when operating over the connectionless network service.

6.1.2.1   Purpose

The procedure is used to transmit TPDUs over the connectionless network service.

6.1.2.2   Network service primitives

The procedure makes use of the following network service primitive:
    N-UNITDATA.

6.1.2.3   Procedure

Each TPDU shall be transmitted in a single invocation of the connectionless network service, over a pre-existing association between a pair of NSAPs. The association is considered by transport entities as permanently established and available.

6.2   Transport protocol data unit (TPDU) transfer

In sub-clause 6.2.2, after the phrase "network service primitives", add "when operating over CONS".

Add the following text to the end of sub-clause 6.2.2:

The procedure uses the following network service primitive when operating over CLNS:
    N-UNITDATA.

Add before the second paragraph of sub-clause 6.2.3, the following text:

When operating over CLNS, the transport entities shall transmit and receive all TPDUs as NS-user data parameters of N-UNITDATA primitives.

In sub-clause 6.2.3, add to the beginning of the second paragraph, "When operating over CONS and".

6.3 Segmenting and reassembling

6.4 Concatenation and separation

In sub-clause 6.4.2, add to the beginning of note 3, "When operating over CONS,".

Add the following text to the end of note 3:

When operating over CLNS, the number of TPDUs that may be concatenated is bounded by the number of transport connections established between two NSAPs and/or the maximum available NSDU size.

6.5 Connection establishment

6.5.1 Purpose

6.5.2 Network service primitives

Add to the beginning of the sentence, "When operating over CONS,".

Add the following text to the end of sub-clause 6.5.2:

When operating over CLNS, the procedure uses the following network service primitive:
N-UNITDATA.

6.5.3 TPDUs and parameters used

6.5.4 Procedure

Re-title sub-clause 6.5.4 as "6.5.4 Procedure for operating over CONS".

Insert the following text as sub-clause 6.5.5:

6.5.5 Procedure for operating over CLNS

A transport connection is established by means of one transport entity (the initiator) transmitting a CR TPDU to the other transport entity (the responder), which replies with a CC TPDU. During this exchange, all information and parameters needed for the transport entities to operate shall be exchanged or negotiated. When an unexpected duplicated CR TPDU is received (with class 4 as preferred class) a CC TPDU shall be returned.

After receiving the CC TPDU, the initiator shall acknowledge the CC TPDU as defined in table 5 (see 6.13 of ISO 8073).

The following information is exchanged:

a) references : Each transport entity chooses a reference to be used by the peer entity which is 16-bits long and which is arbitrary under the following restrictions:

   1) it shall not already be in use nor frozen (see 6.18 of ISO/IEC 8073).
   2) it shall not be zero.

   This mechanism is symmetrical and provides identification of the transport connection itself. The range of references used for transport connections, in a given transport entity, is a local matter.