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Information processing systems — Open Systems Interconnection — Protocol for providing the connectionless-mode transport service

Systèmes de traitement de l'information — Interconnexion de systèmes ouverts — Spécification du protocole pour fournir un service de transport en mode sans connexion

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8602 was prepared by Technical Committee ISO/TC 97, *Information processing systems.*

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.

Contents

Information processing systems — Open Systems Interconnection — Protocol for providing the connectionless-mode transport service

0   Introduction

This International Standard is one of a set of International Standards produced to facilitate the interconnection of computer systems. The set of International Standards 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 the Reference Model for Open Systems Interconnection (ISO 7498). In particular, it is a protocol of the Transport Layer. It is most closely related to the transport service definition (ISO 8072) and the addendum to the transport service definition covering connectionless-mode transmission (ISO 8072/Add. 1), the network service definition (ISO 8348), and the addendum to the network service definition covering connectionless-mode transmission (ISO 8348/Add. 1). The interrelationship of these International Standards is illustrated in figure 1.

The structure of this International Standard is similar to the structure of ISO 8073 in order to facilitate cross reference between the two standards.

1   Scope and field of application

This International Standard specifies

a)   procedures for the connectionless-mode transmission of data and protocol control information from one transport entity to one peer transport entity;

b)   the encoding of the transport-protocol-data-units used for the transmission of data and control information;

c)   procedures for the correct interpretation of transport protocol control information; and

d)   the functional requirements for implementations claiming conformance to this International Standard.

The procedures are defined in terms of

a)   the interactions among peer transport entities through the exchange of transport-protocol-data-units;

b)   the interactions between a transport entity and a transport service user through the exchange of transport service primitives; and

Connectionless-mode transport
service definition

Connectionless-mode
transport protocol
specification

Connection-oriented or connectionless-
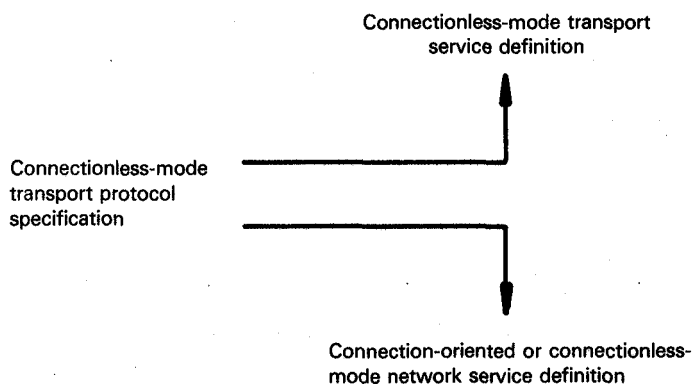mode network service definition

Figure 1 — Relationship between the connectionless-mode transport protocol and adjacent services

c) the interaction between a transport entity and a network service provider through the exchange of network service primitives.

This International Standard specifies the connectionless-mode transport protocol. The connection oriented transport protocol is specified in ISO 8073.

2 References

ISO 7498, *Information processing systems — Open Systems Interconnection — Basic Reference Model.*

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

ISO 8072, *Information processing systems — Open Systems Interconnection — Transport service definition.*

ISO 8072/Add. 1, *Information processing systems — Open Systems Interconnection — Transport service definition — Addendum 1 : Connectionless-mode transmission.*

ISO 8073, *Information processing systems — Open Systems Interconnection — Connection oriented transport protocol specification.*

ISO 8073/Add. 1, *Information processing systems — Open Systems Interconnection — Connection oriented transport protocol specification — Addendum 1 : Network connection management subprotocol.* [1]

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

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

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[1] At present at the stage of draft; publication anticipated in due course.

Section one : General

3 Definitions

3.1 Reference Model definitions

This International Standard is based on the concepts developed in ISO 7498 and ISO 7498/Add. 1, and makes use of the following terms defined therein :

a) Transport Layer;

b) transport service;

c) transport-service-access-point;

d) transport-service-access-point-address;

e) transport-service-data-unit;

f) Network Layer;

g) network service;

h) network connection;

i) network-service-access-point;

j) transport protocol;

k) connectionless-mode transmission.

3.2 Definition from ISO 8073/Add. 1

This International Standard also uses the term below which is defined in ISO 8073/Add. 1. This reference to ISO 8073/Add. 1 does not necessarily imply that the procedures of ISO 8073/Add. 1 are required for the proper operation of the protocol specified in this International Standard.

UN TPDU

3.3 Additional definitions

For the purposes of this International Standard, the following definitions apply.

3.3.1 source-transport-address :
Identifies the TSAP through which the transport service user may act as the source of data during a particular instance of transport connectionless-mode transmission.

3.3.2 destination-transport-address :
Identifies the TSAP through which the transport service user may act as the sink of data during a particular instance of transport connectionless-mode transmission.

3.3.3 connection oriented transport protocol :
See 3.1, "transport protocol".

3.3.4 connection oriented transport service :
See 3.1, "transport service".

3.3.5 connection oriented network service :
See 3.1, "network service".

3.3.6 connectionless-mode transport protocol :
Transport protocol for providing the connectionless-mode transport service.

3.3.7 connectionless-mode transport service :
Transport service providing connectionless-mode transmission.

3.3.8 connectionless-mode network service :
Network service providing connectionless-mode transmission.

4 Symbols and abbreviations

4.1 Data units

TPDU   Transport-protocol-data-unit
TSDU   Transport-service-data-unit
NSDU   Network-service-data-unit

4.2 Types of transport-protocol-data-units

UD TPDU   Unit data TPDU
UN TPDU   Use of network connection TPDU

4.3 TPDU fields

LI   Length indicator

4.4 Parameters

Source TSAP-ID
Destination TSAP-ID
Checksum

4.5 Miscellaneous

TS-user   Transport service user
TSAP   Transport-service-access-point
NSAP   Network-service-access-point

5 Overview of the transport protocol

5.1 Service provided by the Transport Layer

The service provided by the protocol described herein is a connectionless-mode transport service. The connectionless-mode transport service is described in ISO 8072/Add. 1. The transport service primitives provided are summarized in table 1.

Table 1 — Transport service primitives

Primitives	Parameters
T-UNITDATA request	Source address Destination address Quality of service TS-user-data
T-UNITDATA indication	Source address Destination address Quality of service TS-user-data

5.2 Service assumed from the Network Layer

The transport protocol described in this International Standard can operate over the connection oriented network service defined in ISO 8348 and over the connectionless-mode network service defined in ISO 8348/Add. 1.

When operating over the connection oriented network service, the network service primitives given in table 2 are used.

When operating over the connectionless-mode network service, the network service primitives given in table 3 are used.

5.3 Functions of the Transport Layer

5.3.1 Connectionless-mode transfer functions

The purpose of connectionless-mode transfer is to allow the transfer of data between correspondent TS-users on a connectionless basis. This service provides for single-access data transfer for correspondent TS-users without the overhead of transport connection establishment. This purpose is achieved by using functions specific to the connectionless-mode transport protocol. The connectionless-mode transfer functions are primarily intended to benefit those applications that require a one-time, one-way transfer of data, towards one TS-user, taking advantage of mechanisms more simple than the connection oriented ones.

5.3.2 Overview of functions

The functions in the Transport Layer are at least those necessary to bridge the gap between the service available from the Network Layer and the service to be offered to the transport service users.

The functions in the Transport Layer are concerned with the enhancement of the quality of service, including all aspects of cost optimization.

5.3.2.1 Transmission of TPDUs

5.3.2.2 Network service selection

This function selects the network service that best matches the requirements of the TS-user, taking into account charges for various services.

5.3.2.3 Address mapping

This function determines the network address that will be used as the destination address parameter in an N-UNITDATA request or as the called address parameter in an N-CONNECT request by examining the transport address specified by the destination address parameter of a T-UNITDATA request.

5.3.2.4 TSDU delimiting

This function determines the beginning and end of a TSDU.

5.3.2.5 Error detection

This function provides end-to-end error detection for correspondent TS-users utilizing the connectionless-mode transport service. The error detection mechanism is defined in 6.4.

5.4 Model of the Transport Layer

A transport entity communicates with a TS-user through one or more TSAPs by means of transport service primitives, defined in ISO 8072 and in ISO 8072/Add. 1. These transport service primitives cause or result from the exchange of TPDUs between peer transport entities engaged in connectionless-mode transmission. These protocol exchanges are effected by making use of the services of the Network Layer, as defined in ISO 8348 and ISO 8348/Add. 1.

The model of connectionless-mode transport service is presented in 9.2 of ISO 8072/Add. 1.

Table 2 — Connection oriented network service primitives

Primitives	X/Y/Z	Parameters	X/Y/Z
N-CONNECT request indication	X X	Called address Calling address Receipt confirmation selection Expedited data selection QOS parameter set NS-user-data	X X Z Z X Y
N-CONNECT response confirmation	X X	Responding address Receipt confirmation selection Expedited data selection QOS parameter set NS-user-data	X Z Z X Z
N-DATA request indication	X X	NS-user-data Confirmation request	X Z
N-RESET request indication	X X	Reason Originator Reason	Z Z Z
N-RESET response confirmation	X X	— —	
N-EXPEDITED DATA request indication	Z Z		
N-DATA ACKNOWLEDGE request indication	Z Z		
N-DISCONNECT request indication	X X	Reason NS-user-data Responding address Originator Reason NS-user-data Responding address	Z Z Z Z Z Z Z

Key :

X : The transport protocol assumes that this facility is provided in all networks.

Y : The transport protocol assumes that this facility is provided in some networks and a mechanism is provided to optionally use the facility.

Z : The transport protocol does not use this facility and will ignore it when received.

Table 3 — Connectionless-mode network service primitives

Primitives	X/Y/Z	Parameters	X/Y/Z
N-UNITDATA request	X	Destination address Source address Quality of service NS-user-data	X X* X X
N-UNITDATA indication	X	Destination address Source address Quality of service NS-user-data	X* X X X

* This parameter may be implicitly associated with the network-service-access-point at which the primitive is issued.
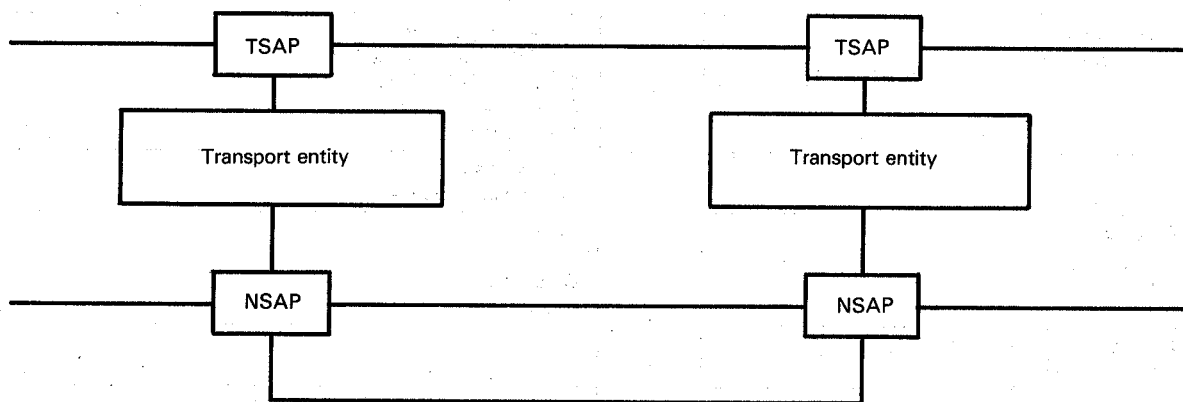
Figure 2 — Model of the Transport Layer

Section two : Connectionless-mode transport protocol specification

6 Protocol mechanisms

6.1 Transport-protocol-data-unit (TPDU) transfer

6.1.1 Purpose

The TPDU transfer procedure is used to convey transport-protocol-data-units in user data fields of network service primitives.

6.1.2 Network service primitives

The procedure uses the following network service primitives :

a) N-DATA (request, indication);

b) N-UNITDATA (request, indication).

6.1.3 TPDU used

The TPDU defined for the connectionless-mode transport protocol is the following :

UD UNITDATA

6.2 Transfer over the connectionless-mode network service

6.2.1 Purpose

The procedure of transfer over the connectionless-mode network service is used for one-time, one-way transferring of a TSDU between TS-users without confirmation of receipt, without transport connection establishment and release, and without network connection establishment and release.

6.2.2 Network service primitives

The procedure uses the following network service primitives :

N-UNITDATA (request, indication)

6.2.3 TPDU and parameters used

The procedure uses the following TPDU and parameters :

UD — Checksum;

— Source TSAP-ID;

— Destination TSAP-ID;

— User data.

6.2.4 Procedure

6.2.4.1 Sending a UD TPDU

The source and destination address parameters of the T-UNITDATA request service primitive are used to determine

the source network address, source TSAP-ID, destination network address, and destination TSAP-ID.

The quality of service parameter in the T-UNITDATA request is used to determine if a checksum should be included in the unit data UD TPDU.

NOTE — If the length of the TSDU given in the T-UNITDATA request, plus the PCI of the UD TPDU exceeds the maximum NSDU size supported by the network service, then the TSDU is discarded and a local report may be made to the TS-user indicating the inability of the Transport Layer to provide the service requested.

A UD TPDU is constructed with a checksum parameter (if necessary), a source TSAP-ID, a destination TSAP-ID, and the user data field from the T-UNITDATA request.

An N-UNITDATA request service primitive is issued with the source and destination network addresses determined above, the quality of service requested and a user data field containing the UD TPDU.

6.2.4.2 Receiving a UD TPDU

The UD TPDU arrives in the user data field of an N-UNITDATA indication.

If a checksum parameter is present in the UD TPDU then a checksum verification will be made of the UD TPDU using the algorithm defined in 6.4. If the result of this verification is false, then the TPDU is discarded. If the result of this verification is true, or if the checksum mechanism is not used, then the transport entity will construct a T-UNITDATA indication and provide it to the appropriate transport service user.

The source network address from the N-UNITDATA indication and the source TSAP-ID from the UD TPDU will be used to determine the source address parameter for the T-UNITDATA indication.

The destination network address from the N-UNITDATA indication and the destination TSAP-ID from the UD TPDU will be used to determine the destination address parameter for the T-UNITDATA indication.

The user data field of the UD TPDU will be mapped to the user data parameter of the T-UNITDATA indication.

The QOS parameter is derived from the *a priori* knowledge of the QOS available from the association and whether the *checksum mechanism was used*.

6.2.4.3 Use of connectionless-mode network service

Each TPDU is transmitted by the use of the connectionless-mode network service over a pre-existing association between a pair of NSAPS. This association is considered by transport entities as permanently established and available.