INTERNATIONAL STANDARD

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Information technology — Open Systems Interconnection — Connectionless protocol for the Association Control Service Element: Protocol specification

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Élément de service de contrôle d'association: Spécification du protocole

Reference number
ISO/IEC 10035-1:1995(E)

CONTENTS

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 10035-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.237.

This second edition cancels and replaces the first edition (ISO/IEC 10035:1991), which has been technically revised.

ISO/IEC 10035 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Connectionless protocol for the Association Control Service Element*:

— *Part 1: Protocol specification*

— *Part 2: Protocol Implementation Conformance Statement (PICS) proforma*

Annex A forms an integral part of this part of ISO/IEC 10035. Annex B is for information only.

Introduction

This Protocol Specification is one of a set of Recommendations and International Standards produced to facilitate the interconnection of information processing systems. It is related to other Recommendations and International Standards in the set as defined by the Reference Model for Open Systems Interconnection (see ITU-T Rec. X.200 | ISO/IEC 7498-1). The reference model subdivides the areas of standardization for interconnection into a series of layers of specification, each of manageable size.

The goal of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection Recommendations and International Standards, the interconnection of information processing systems:

- from different manufacturers;
- under different managements;
- of different levels of complexity; and
- of different technologies.

This Protocol Specification specifies the protocol for the A-UNIT-DATA service for the Association Control Service Element (ACSE). The A-UNIT-DATA service provides for information transfer between application-entities utilizing the connectionless presentation service. This service is intended to be applicable to a wide range of application process communication requirements.

This Protocol Specification includes an annex that describes the protocol machine of ACSE in terms of a state table. This protocol machine is referred to as the Association Control Protocol Machine (ACPM).

The protocol defined in this Protocol Specification uses the connectionless presentation-service (see ITU-T Rec. X.216 | ISO/IEC 8822).

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ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – CONNECTIONLESS PROTOCOL FOR THE ASSOCIATION CONTROL SERVICE ELEMENT: PROTOCOL SPECIFICATION

1 Scope

The ACSE supports two modes of communication: connection-oriented and connectionless. The ACSE Service Definition (see ITU-T Rec. X.217 | ISO/IEC 8649) includes both modes of communication. This Recommendation | International Standard provides the protocol specification of the connectionless mode of communication. The protocol specification for the connection-oriented mode of communication is contained in ITU-T Rec. X.227 | ISO/IEC 8650-1.

This Protocol Specification specifies:

a) procedures for the transfer of information, between application-entities; and

b) the abstract syntax for the representation of the A-UNIT-DATA ACSE APDU.

The A-UNIT-DATA procedure is defined in terms of:

a) the interactions between peer ACSE protocol machines by the use of connectionless presentation-service; and

b) the interaction between an ACSE protocol machine and its service-user.

These procedures are applicable to instances of communication between systems which wish to communicate in an open systems interconnection environment in a connectionless mode.

This Protocol Specification also specifies conformance requirements for systems implementing this procedure. It does not contain tests which can be used to demonstrate conformance.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model.*
- ITU-T Recommendation X.207 (1993) | ISO/IEC 9545:1994, *Information technology – Open Systems Interconnection – Application Layer structure.*

- ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: Conventions for the definition of OSI services.*
- ITU-T Recommendation X.215 (1994) | ISO/IEC 8326...[1)], *Information technology – Open Systems Interconnection – Session service definition.*
- ITU-T Recommendation X.216 (1994) | ISO/IEC 8822:1994, *Information technology – Open Systems Interconnection – Presentation service definition.*
- ITU-T Recommendation X.217 (1995) | ISO/IEC 8649...[1)], *Information technology – Open Systems Interconnection – Service definition for the Association Control Service Element.*
- ITU-T Recommendation X.227 (1995) | ISO/IEC 8650-1...[1)], *Information technology – Open Systems Interconnection – Connection-oriented protocol for the Association Control Service Element: Protocol specification.*
- ITU-T Recommendation X.257 (1995) | ISO/IEC 10035-2...[1)], *Information technology – Open Systems Interconnection – Connectionless protocol for the Association Control Service Element: Protocol Implementation Conformance Statement (PICS) proforma.*
- ITU-T Recommendation X.680 (1994) | ISO/IEC 8824-1:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.690 (1994) | ISO/IEC 8825-1:1995, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).*

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.650 (1992), *Open Systems Interconnection (OSI) – Reference Model for naming and addressing.*
- ISO 7498-3:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 3: Naming and addressing.*

3 Definitions

For the purposes of this Protocol Specification, the following definitions apply.

3.1 Reference model definitions

This Protocol Specification is based on the concepts developed in ITU-T Rec. X.200 | ISO/IEC 7498-1 and makes use of the following terms defined therein:

a) Application Layer;
b) application-process;
c) application-entity;
d) application-service-element;
e) application-protocol-data-unit;
f) connectionless-mode presentation-service;
g) connectionless-mode session-service; and
h) (N)-connectionless-mode transmission.

1) To be published.

3.2 Naming and addressing definitions

This Protocol Specification makes use of the following terms defined in CCITT Rec. X.650 | ISO 7498-3:

a) application-entity qualifier;
b) application-entity invocation-identifier;
c) application-process title;
d) application-process invocation-identifier; and
e) presentation address.

3.3 Service conventions definitions

This Protocol Specification makes use of the following terms defined in ITU-T Rec. X.210 | ISO/IEC 10731:

a) service-provider;
b) service-user;
c) non-confirmed service;
d) primitive;
e) request (primitive); and
f) indication (primitive).

3.4 Presentation service definitions

This Protocol Specification makes use of the following terms defined in ITU-T Rec. X.216 | ISO/IEC 8822:

a) presentation data valuc;
b) abstract syntax; and
c) abstract syntax name.

3.5 ACSE service definitions

This Protocol Specification makes use of the following terms defined in ITU-T Rec. X.217 | ISO/IEC 8649:

a) application-association;
b) application context;
c) Association Control Service Element;
d) ACSE service-user;
e) ACSE service-provider;
f) requestor; and
g) acceptor.

3.6 Application Layer Structure definitions

This Protocol Specification makes use of the following terms defined in ITU-T Rec. X.207 | ISO/IEC 9545:

– application-entity invocation.

4 Abbreviations

4.1 Data units

APDU Application-protocol-data-unit

4.2 Types of application-protocol-data-units

The following abbreviation has been given to the application-protocol-data-unit defined in this Protocol Specification:

AUDT A-UNIT-DATA APDU

4.3 Other abbreviations

The following abbreviations are used in this Protocol Specification:

ACPM	Association Control Protocol Machine
ACSE	Association Control Service Element
AE	Application Entity
AEI	Application Entity Invocation
AP	Application Process
APCI	Application Protocol Control Information
ASE	Application Service Element
ASN.1	Abstract Syntax Notation One
OSI	Open Systems Interconnection

5 Conventions

5.1 This Protocol Specification employs a tabular presentation of its APDU fields. In clause 7, a table is presented for the AUDT APDU. Each field is summarized using the following notation:

M	Presence is mandatory
O	Presence is ACPM option
U	Presence is an ACSE service-user option
req	Source is related request primitive
ind	Sink is related indication primitive
sp	Source or sink is the ACPM

5.2 The structure of the AUDT APDU is specified in clause 9 using the ASN.1 (see ITU-T Rec. X.680 | ISO/IEC 8824-1).

6 Overview of the Protocol

6.1 Service provision

The protocol specified in this Protocol Specification provides the A-UNIT-DATA service defined in ITU-T Rec. X.217 | ISO/IEC 8649.

6.2 Use of the presentation-service

6.2.1 The ACSE protocol specified in this Protocol Specification uses the P-UNIT-DATA connectionless presentation-service defined in ITU-T Rec. X.216 | ISO/IEC 8822 to pass information in the form of an AUDT APDU, between peer application-entity invocations (AEIs).

6.3 Model

6.3.1 The A-UNIT-DATA protocol machine communicates with its service user by means of primitives defined in ITU-T Rec. X.217 | ISO/IEC 8649 for A-UNIT-DATA service.

6.3.2 The A-UNIT-DATA protocol machine is driven by the use of the A-UNIT-DATA request primitive and by the presentation P-UNIT-DATA indication primitive.

6.3.3 During an instance of communication, the existence of both sending and receiving AEI is presumed. How these AEIs are created is outside the scope of this Protocol Specification.

7 Elements of Procedure

The A-UNIT-DATA protocol consists of the A-UNIT-DATA transfer procedure.

7.1 A-UNIT-DATA transfer

7.1.1 Purpose

The A-UNIT-DATA transfer procedure is used to transmit a unit of information from one AEI to another AEI. It supports the A-UNIT-DATA service.

7.1.2 APDUs used

The A-UNIT-DATA transfer procedure uses the A-UNIT-DATA (AUDT) APDU. The fields of the AUDT APDU are listed in Table 1.

7.1.3 A-UNIT-DATA transfer procedure

This procedure is driven by the following events:

a) an A-UNIT-DATA request primitive from the requestor;

b) an AUDT APDU as user data on a P-UNIT-DATA indication primitive.

7.1.3.1 A-UNIT-DATA request primitive

7.1.3.1.1 The sending ACPM forms an AUDT APDU using parameter values from the A-UNIT-DATA request primitive and its own stored data (the Protocol Version field and Implementation Information field). It issues a P-UNIT-DATA request primitive using information from the A-UNIT-DATA request primitive. The User Data parameter of the P-UNIT-DATA request primitive contains the AUDT APDU.

7.1.3.2 AUDT APDU

7.1.3.2.1 The receiving ACPM receives the AUDT APDU as user data on a P-UNIT-DATA indication primitive. If any of the parameters of the P-UNIT-DATA indication primitive or the fields of the AUDT APDU are unacceptable to this ACPM, it discards the AUDT APDU.

7.1.4 Use of the AUDT APDU fields

The AUDT APDU fields are used as shown in Table 1.

7.1.4.1 Protocol Version

For the sending ACPM: The value assigned to this field is determined within the implementation of the ACPM. It is a variable length bit string, where a bit set to one indicates the version of ACSE protocol that this ACPM supports. Bit 0 represents version 1; bit 1 represents version 2, etc. Only one bit can be set by the sending ACPM indicating support of a specific version. No trailing bits higher than the highest version of this Protocol Specification that the sending ACPM supports are included. That is, only one bit which is the last bit of the string is set to one.

For the receiving ACPM: The receiving ACPM will discard the received AUDT APDU if its version is not supported.

Table 1 – AUDT APDU Fields

Field Name	Presence	Source	Sink
Protocol Version	O	sp	sp
Application Context Name	M	req	ind
Calling AP Title	U	req	ind
Calling AE Qualifier	U	req	ind
Calling AP Invocation-Identifier	U	req	ind
Calling AE Invocation-Identifier	U	req	ind
Called AP Title	U	req	ind
Called AE Qualifier	U	req	ind
Called AP Invocation-Identifier	U	req	ind
Called AE Invocation-Identifier	U	req	ind
Implementation Information	O	sp	sp
User Information	M	req	ind

7.1.4.2 Application Context Name

For the sending ACPM: This value is determined by the value of the Application Context Name parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Application Context Name parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.3 Calling AP Title

For the sending ACPM: This value is determined by the value of the Calling AP Title parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Calling AP Title parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.4 Calling AE Qualifier

For the sending ACPM: This value is determined by the value of the Calling AE Qualifier parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Calling AE Qualifier parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.5 Calling AP Invocation-identifier

For the sending ACPM: This value is determined by the value of the Calling AP Invocation-identifier parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Calling AP Invocation-identifier parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.6 Calling AE Invocation-identifier

For the sending ACPM: This value is determined by the value of the Calling AE Invocation-identifier parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Calling AE Invocation-identifier parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.7 Called AP Title

For the sending ACPM: This value is determined by the value of the Called AP Title parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Called AP Title parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.8 Called AE Qualifier

For the sending ACPM: This value is determined by the value of the Called AE Qualifier parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Called AE Qualifier parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.9 Called AP Invocation-identifier

For the sending ACPM: This value is determined by the value of the Called AP Invocation-identifier parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Called AP Invocation-identifier parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.10 Called AE Invocation-identifier

For the sending ACPM: This value is determined by the value of the Called AE Invocation-identifier parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the Called AE Invocation-identifier parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.4.11 Implementation Information

For the sending ACPM: This value assigned to this field is determined within the implementation of the ACPM. It contains information specific to the individual implementation of that ACPM.

For the receiving ACPM: This field does not affect the operation of the ACPM. Any use depends on a common understanding between sending and receiving ACPMs.

7.1.4.12 User Information

For the sending ACPM: This value is determined by the value of the User Information parameter of the A-UNIT-DATA request primitive.

For the receiving ACPM: This value is used to determine the value of the User Information parameter of the A-UNIT-DATA indication primitive, if issued.

7.1.5 Collisions and interactions

Overlapping attempts by two requestors to send AUDTs result in the communication of both units of information.

7.2 Rules for extensibility

When processing an incoming AUDT, the receiving ACPM shall:

a) ignore all tagged values that are not defined in the abstract syntax definition of this Protocol Specification; and

b) ignore all unknown bit name assignments within a bit string.

8 Mapping to the Connectionless Presentation-Service

This clause defines how the connectionless presentation-service primitives are used by the ACPM. Table 2 defines the mapping of ACSE service primitives and its APDU to presentation-service primitives.

Table 2 – Mapping Overview

ACSE-primitive	APDU	Presentation-primitive
A-UNIT-DATA request/indication	AUDT	P-UNIT-DATA request/indication

8.1 A-UNIT-DATA transfer

A-UNIT-DATA transfer utilizes the underlying connectionless presentation-service.

8.1.1 Directly mapped parameters

The following parameters of the A-UNIT-DATA primitives are mapped directly onto the corresponding parameters of the P-UNIT-DATA primitives:

a) Calling Presentation Address;

b) Called Presentation Address;

c) Quality of Service; and

d) Presentation Context Definition List.

8.1.2 Use of other P-UNIT-DATA request and indication parameters

The User Data parameters of the P-UNIT-DATA request and indication primitives is referenced by the ACPM. It is used to carry the AUDT APDU as specified below:

a) The abstract syntax for the AUDT APDU is defined in clause 9. This abstract syntax must be included as the value of a presentation context definition parameter specified by the requestor on the A-UNIT-DATA request primitive.

NOTE – The sending and receiving ACPMs are aware of the presentation context that contains their abstract syntax by a local mechanism.

b) User Information from the A-UNIT-DATA request primitive is included in the AUDT APDU and is expressed using one or more presentation contexts specified by the requestor on the A-UNIT-DATA request primitive.

9 Abstract Syntax Definition of APDUs

9.1 The abstract syntax of each of the ACSE APDUs is specified in this clause using ASN.1 (ITU-T Rec. X.680 | ISO/IEC 8824-1).

Connectionless-ACSE-1{joint-iso-itu-t association-control(2) module(2) clacse1(2) version(1) }

DEFINITIONS::=

```
BEGIN
-- Connectionless-ACSE-1 refers to ITU-T Rec. X.237 | ISO/IEC 10035-1

IMPORTS
        AP-title, AE-qualifier, AE-title
        FROM ACSE-1
            {joint-iso-itu-t association-control(2) module(2) acse1(1) version(1)        }
-- The data types AP-title and AE-qualifier are imported from ITU-T Rec. X.227 | ISO/IEC 8650-1

AUDT-apdu ::=  [APPLICATION 0]      IMPLICIT SEQUENCE
{ protocol-version                  [0]   IMPLICIT BIT STRING
                                          {version1 (0)} DEFAULT {version1}
application-context-name            [1]   Application-context-name,
called-AP-title                     [2]   AP-title                          OPTIONAL,

called-AE-qualifier                 [3]   AE-qualifier                      OPTIONAL,
called-AP-invocation-id             [4]   AP-invocation-id                  OPTIONAL,
called-AE-invocation-id             [5]   AE-invocation-id                  OPTIONAL,
calling-AP-title                    [6]   AP-title                          OPTIONAL,
calling-AE-qualifier                [7]   AE-qualifier                      OPTIONAL,
calling-AP-invocation-id            [8]   AP-invocation-id                  OPTIONAL,
calling-AE-invocation-id            [9]   AE-invocation-id                  OPTIONAL,
implementation-information          [29]  IMPLICIT Graphic String          OPTIONAL,
user-information                    [30]  IMPLICIT SEQUENCE OF EXTERNAL
}

Application-context-name ::= OBJECT IDENTIFIER

-- As defined in CCITT Rec. X.650 | ISO 7498-3, an application-entity title is composed of an
-- application-process title and an application-entity qualifier. The ACSE protocol provides for the
-- transfer of an application-entity title value by the transfer of its component values.

AE-invocation-id ::= INTEGER
AE-invocation-id ::= INTEGER
END
```

9.2 The following name, that has the ASN.1 type of OBJECT IDENTIFIER, applies to the connectionless ACSE abstract syntax definition specified in this clause:

{joint-iso-itu-t association-control(2) abstract-syntax(1) clapdu(1) version(1)}

9.3 The set of encoding rules named

{joint-iso-itu-t asn1(1) basic-encoding(1)}

and specified in ITU-T Rec. X.690 | ISO/IEC 8825-1 is applicable to the connectionless ACSE abstract syntax definition.

10 Conformance

A system claiming to implement the procedures specified in this Protocol Specification shall comply with the requirements in 10.1 through 10.3.

10.1 Statement requirements

The following shall be stated by the implementor:

a) whether the system is capable of acting in the role of A-UNIT-DATA requestor or acceptor, or both:

b) that the system supports this protocol.

NOTE – A PICS (Protocol Implementation Conformance Statement) for this Protocol Specification is contained in ITU-T Rec. X.257 | ISO/IEC 10035-2.

10.2 Static requirements

The system shall:

a) act in the role of a requestor (by sending an AUDT APDU) or acceptor (by receiving an AUDT APDU), or both;

b) support (as a minimum) that encoding which results from applying the basic ASN.1 encoding rules to the ASN.1 specified in clause 9 for the purpose of communicating ACSE APCI.

10.3 Dynamic requirements

The system shall:

a) follow all the procedures specified in clause 7 (including the rules for extensibility) and Annex A; and

b) support the mapping onto the connectionless presentation service defined in clause 8.

11 Precedence

Any person encountering an inaccuracy or ambiguity in this Protocol Specification is requested to notify the Telecommunication Standardization Bureau of the ITU-T or ISO/IEC Secretariat without delay in order that the matter may be investigated and appropriate action taken.