

130/1EC 8650-1

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# Information technology — Open Systems Interconnection — Connection-oriented protocol for the Association Control Service Element: Protocol specification

Technologies de l'information : Interconnexion de systèmes ouverts (OSI) — Protocole en mode orienté connexion pour l'élément de service de contrôle d'association: Spécification du protocole

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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. 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 8650-1 was prepared by Joint Technical Committee ISO/IEC JTC), 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.227.

This second edition cancels and replaces the first edition (ISO 8650:1988), which has been technically revised. It also incorporates Amendment 1:1990 and Technical Corrigendum 1:1990.

ISO/IEC 8650 consists of the following parts, under the general title *Information technology* — *Open Systems Interconnection* — *Connection-oriented protocol for the Association Control Service Element*:

- Part 1: Protocol specification
- Part 2: Protocol Implementation Conformance Statement (PICS) proforma

Annexes A and B form an integral part of this part of ISO/IEC 8650.

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# 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 ITU-T 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 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 connection-oriented mode protocol for the application-service-element for application-association control: the Association Control Service Element (ACSE). The protocol for the ACSE connectionless mode service (A-UNIT-DATA) is specified in ITU-T Rec. X.237 | ISO/IEC 10035-1.

This Recommendation | International Standard specifies the protocol for the application-service-element for application-association control: the Application Control Service Element (ACSE). The ACSE provides services for establishing and releasing application-associations. The ACSE protocol includes two optional functional units. One functional unit supports the exchange of information in support of authentication during association establishment. The second functional unit supports the negotiation of application context during association establishment. The ACSE services apply to a wide range of application-process communications 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 is also governed by the use of the presentation-service (ITU-T Rec. X.216 | ISO/IEC 8822) and the session-service (see ITU-T Rec. X.215 | ISO/IEC 8326).

Quality of Service (QOS) is a parameter of the A-ASSOCIATE service. Work is still in progress to provide an integrated treatment of QOS across all of the layers of the OSI Reference Model and to ensure that the individual treatments in each layer service satisfy overall QOS objectives in a consistent manner. As a consequence, an addendum may be added to this Protocol Specification at a later time which reflects further QOS developments and integration.

# INTERNATIONAL STANDARD

# ITU-T RECOMMENDATION

# INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – CONNECTION-ORIENTED PROTOCOL FOR THE ASSOCIATION CONTROL SERVICE ELEMENT: PROTOCOL SPECIFICATION

# 1 Scope and field of application

The ACSE supports two modes of communication: connection-oriented and connectionless. The ACSE service definition (ITU-T Rec. X.217 | ISO/IEC 8649) includes both modes of communication. This Protocol Specification provides the protocol specification for the connection-oriented mode of communication. The protocol specification for the connectionless mode of communication is contained in ITU-T Rec. X.237 | ISO/IEC 10035-1.

This Protocol Specification defines procedures that are applicable to instances of communication between systems which wish to interconnect in an Open Systems Interconnection environment in a connection-oriented mode. The Protocol Specification includes the Kernel functional unit that is used to establish and release application-associations. The Authentication functional unit provides additional facilities for exchanging information in support of authentication during association establishment without adding new services. The ACSE authentication facilities can be used to support a limited class of authentication methods. The Application Context Negotiation functional unit provides additional facility for the selection of the application context during association establishment.

This Protocol Specification specifies: STANDARD PREVIEW

- a) procedures for the transfer of information for application-association control and the authentication of application-entities;
- b) the interaction between an ACSE protocol machine and the occurrence of external presentation events; and https://standards.iteh.ai/catalog/standards/sist/294d4883-7f15-48d3-ba8a-
- c) the abstract syntax for the representation of the ACSE-APDUs.

The ACSE procedures are defined in terms of:

- a) the interactions between peer ACSE protocol machines through the use of presentation-services; and
- b) the interaction between an ACSE protocol machine and its service-user.

This Protocol Specification also specifies conformance requirements for systems implementing these procedures. 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 International Standards are subject to revision, and the 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 (1995) | ISO/IEC 8326:1996, 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 8649:1996, Information technology Open Systems Interconnection - Service definition for the Association Control Service Element.
- ITU-T Recommendation X.225 (1995) | ISO/IEC 8327-1:1996, Information technology Open Systems
   Interconnection Connection-oriented Session protocol: Protocol specification.
- ITU-T Recommendation X.237 (1995) | ISO/IEC 10035-1:1995, Information technology Open Systems
   Interconnection Connectionless protocol for the Association Control Service Element: Protocol
   specification.
- CCITT Recommendation X.660 (1992) | ISO/IEC 9834-1:1993, Information technology Open Systems Interconnection Procedures for the operation of OSI Registration Authorities: General procedures.
- CCITT Recommendation X.665 (1992) | ISO/IEC 9834-6:1993, Information technology Open Systems
   Interconnection Procedures for the operation of OSI Registration Authorities: Application Processes
   and Application Entities.
- 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.208 (1988), Specification of Abstract Syntax Notation One (ASN.1).
   ISO/IEC 8824:1990, Information technology Open Systems Interconnection Specification of Abstract Syntax Notation One (ASN.1).
- 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.
- CCITT Recommendation X.800 (1991) Security architecture for Open Systems Interconnection for CCITT applications. 9793e24fa20b/iso-iec-8650-1-1996
  - ISO 7498-2:1989, Information processing systems Open Systems Interconnection Basic Reference Model Part 2: Security Architecture.

### 2.3 Additional references

- CCITT Recommendation X.410 (1984), Message Handling Systems: Remote operation and reliable transfer server.
- ISO 6523:1984, Data interchange Structures for the identification of organizations.

# 3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply:

# 3.1 Reference Model definitions

# 3.1.1 Basic 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 in it:

- a) Application Layer;
- b) application-process;
- c) application-entity;
- d) application-service-element;
- e) application-protocol-data-unit;

- f) application-protocol-control-information;
- g) presentation-service;
- h) presentation-connection;
- i) session-service;
- j) session-protocol; and
- session-connection.

#### 3.1.2 Security architecture definitions

This Protocol Specification makes use of the following term defined in CCITT Rec. X.800 | ISO 7498-2:

password.

#### 3.1.3 Naming and addressing definitions

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

- application-process title;
- application-entity qualifier; b)
- application-entity title<sup>1)</sup>; c)
- d) application-process invocation-identifier;
- application-entity invocation-identifier; and e)
- presentation address.

#### 3.2 Service conventions definitions

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

- service-user; b)

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- confirmed service; c)
- non-confirmed service; d)

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- .iteh.ai/catalog/standards/sist/294d4883-7f15-48d3-ba8a-
- provider-initiated service;9793e24fa20b/iso-iec-8650-1-1996 e)
- f) primitive;
- request (primitive); g)
- h) indication (primitive);
- i) response (primitive); and
- **i**) confirm (primitive).

#### 3.3 Presentation service definitions

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

- a) abstract syntax;
- b) abstract syntax name;
- default context; c)
- d) defined context set;
- e) functional unit (presentation);
- f) normal mode (presentation);
- presentation context;

<sup>1)</sup> 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.

# ISO/IEC 8650-1: 1996 (E)

- h) presentation data value; and
- i) X.410-1984 mode (presentation).

# 3.4 Application Layer Structure definitions

This Protocol Specification makes use of the following terms defined in ISO/IEC 9545:

- a) application-context;
- b) application-entity invocation;
- c) control function; and
- d) application-service object.

# 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; association;
- b) Association Control Service Element;
- c) ACSE service-user;
- d) ACSE service-provider;
- e) requestor;
- f) acceptor;
- g) association-initiator;
- h) association-responder: h STANDARD PREVIEW
- j) authentication;
- j) authentication-function;

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k) authentication-value;

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- 1) authentication-mechanism; ls.iteh.ai/catalog/standards/sist/294d4883-7f15-48d3-ba8a-
- m) normal mode;
- n) X.410-1984 mode; and
- o) disrupt.

# 3.6 Association Control protocol specification definitions

The following terms are introduced in this Protocol Specification:

- **3.6.1 Association Control Protocol Machine**: The protocol machine for the Association Control Service Element specified in ITU-T Rec. X.227 | ISO/IEC 8650-1.
- **3.6.2** requesting Association Control Protocol Machine: The Association Control Protocol Machine whose service-user is the requestor of a particular Association Control Service Element service.
- **3.6.3** accepting Association Control Protocol Machine: The Association Control Protocol Machine whose service-user is the acceptor for a particular Association Control Service Element service.
- **3.6.4 external event (to an ASE)**: A service primitive that is not directly referenced by an ASE but that may disrupt a service procedure of the ASE.

### 4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply:

# 4.1 Data units

APDU application-protocol-data-unit

4 ITU-T Rec. X.227 (1995 E)

ISO/IEC 8650-1: 1996 (E)

#### 4.2 Types of application-protocol-data-units

The following abbreviations have been given to the application-protocol-data-units defined in this Protocol Specification:

AARQ A-ASSOCIATE-REQUEST APDU

AARE A-ASSOCIATE-RESPONSE APDU

RLRO A-RELEASE-REQUEST APDU

RLRE A-RELEASE-RESPONSE APDU

**ABRT** A-ABORT APDU

#### 4.3 Other abbreviations

The following abbreviations are used in this Protocol Specification:

**ACPM Association Control Protocol Machine** 

**ACSE** Association Control Service Element

ΑE application-entity

**AEI** application-entity invocation

AP application-process

**APCI** application-protocol-control-information

**ASE** application-service-element

application-service-object NDARD PREVIEW **ASO** 

Abstract Syntax Notation One (standards.iteh.ai) ASN.1

CF **Control Function** 

confirm primitive cnf ISO/IEC 8650-1:1996

indication primitive 0702-245-201 "...indication primitive 0702-245 ind

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**OSI** Open Systems Interconnection

req request primitive

**ROA** recognized operating agency

OOS Quality of Service

#### 5 Conventions

This Protocol Specification employs a tabular presentation of its APDU fields. In clause 7, tables are presented for each ACSE APDU. Each field is summarized using the following notation:

M Presence is mandatory

O Presence is ACPM option

U Presence is ACSE service-user option

req Source is related request primitive

ind Sink is related indication primitive

Source is related response primitive rsp

cnf Sink is related confirm primitive

**ACPM** Source or sink is the ACPM

The structure of each ACSE APDU is specified in clause 9 using the Abstract Syntax Notation of ASN.1 (see CCITT Rec. X.208:1988 and ISO/IEC 8824:1990).

#### Overview of the protocol 6

#### 6.1 Service provision

The protocol in this Protocol Specification provides the connection-oriented services defined in ITU-T Rec. X.217 | ISO/IEC 8649. Both the connection-oriented and connectionless services are listed in Table 1. The protocol for the connectionless A-UNIT-DATA service is specified in ITU-T Rec. X.237 | ISO/IEC 10035-1.

For a particular association, the ACSE connection-oriented services operate either in the normal mode or in the X.410-1984 mode. The mode of operation is determined by the Mode parameter on the A-ASSOCIATE request primitive.

Communication mode	Service	Туре
Connection-oriented	A-ASSOCIATE A-RELEASE A-ABORT A-P-ABORT	Confirmed Confirmed Non-confirmed Provider-initiated
Connectionless	A-UNIT-DATA	Non-confirmed

Table 1 - ACSE-services

#### 6.2 **Functional units**

Functional units are used by this Protocol Specification to negotiate ACSE user requirements during association establishment. Three functional units are defined: (Standards.iteh.ai)

- Kernel functional unit:
- Authentication functional unit; and ISO/IEC 8650-1:1996 b)
- Application Context Negotiation functional unit.ds/sist/294d4883-7f15-48d3-ba8aec-8650-1-1996

The ACSE Requirements fields on the AARQ and AARE APDUs are used to select the functional units for the association.

The Kernel functional unit is always available. It is the default functional unit. To be included, the Authentication functional unit and the Application Context Name functional unit shall be explicitly requested on the AARQ APDU and accepted on the AARE APDU.

The selection of the Authentication functional unit supports additional fields on the AARQ, AARE, ABRT and RLRQ APDUs. The selection of the Application Context Negotiation functional unit supports an additional field on the AARQ and the AARE APDUs. Neither functional unit affects the elements of procedure. Table 2 shows the services, APDUs and APDU fields associated with the ACSE functional units.

#### 6.3 Use of the presentation-service

ACSE's use of the presentation-service is determined by ACSE's mode of operation for an association as specified below:

- ACSE normal mode: The ACPM uses the normal mode of the presentation-service (see ITU-T Rec. X.216 ISO/IEC 8822). The ACPM uses the presentation-service Kernel functional unit to exchange its APCI and, optionally, ACSE service-user information (i.e. ACSE APDUs) with its peer. The use of additional presentation-service functional units is an ACSE service-user choice. This choice does not affect the operation of the ACPM.
- ACSE X.410-1984 mode: The ACPM uses the X.410-1984 mode of the presentation-service. Only the Kernel functional unit is available when using the presentation-service X.410-1984 mode. In this mode, the ACPM does not exchange its own APCI with its peer. It simply passes through information supplied to it by the ACSE service-user or by the presentation-service.

This Protocol Specification assumes that the ACPM is the sole user of the P-CONNECT, P-RELEASE, P-U-ABORT, and P-P-ABORT services. The ACSE neither uses nor constrains the use of any other presentation service.

Table 2 - Functional unit APDUs and their fields

Functional Unit	Service	APDU	Field Name
Kernel	A-ASSOCIATE	AARQ	Protocol Version Application Context Name Calling AP Title Calling AE Qualifier Calling AP Invocation-identifier Calling AE Invocation-identifier Called AP Title Called AE Qualifier Called AE Invocation-identifier Called AE Invocation-identifier User Information
		AARE	Protocol Version Application Context Name Responding AP Title Responding AE Qualifier Responding AP Invocation-identifier Responding AE Invocation-identifier Responding AE Invocation-identifier Result Result Source-Diagnostic Implementation Information User Information
	A-RELEASE	RLRQ	Reason User Information
	iTeh STAND A-ABORT (standa	RLRE ARD F ABRT Irds.ite	Reason User-Information Abort Source User Information
Authentication	A-ASSOCIATE  ISO/II  ttps://standards.iteh.ai/catalog/s 9793e24fa20	andards/sist/29	ACSE Requirements Authentication-mechanism Name Authentication-yalue8a- 1-1996 Ditto
		ABRT	Diagnostic
Application Context Negotiation	A-ASSOCIATE	AARQ	Application Context Name List ACSE Requirements
		AARE	Ditto

The ACPM does not use the P-RESYNCHRONIZE, P-U-EXCEPTION-REPORT, or P-P-EXCEPTION-REPORT services. However, the A-RELEASE procedure is disrupted if a primitive of one of these presentation services occurs on the association. The disruption is made visible to the ACPM by the occurrence of an external event.

When supported by Version 1 of the session-protocol (see ITU-T Rec. X.225 | ISO/IEC 8327-1), the presentation-service is subject to length restrictions for its user-data parameters. This Protocol Specification assumes that a local mechanism detects violations of these constraints and makes the ACSE service-user aware of them. An encoding optimization is specified for A-ABORT to mitigate this problem (see 7.3.3.1).

# 6.4 Relationship to the session-service

The session functional units required for the session-connection that supports the presentation-connection (that in turn supports the association) are determined by the A-ASSOCIATE service requestor and acceptor. They accomplish this using the Session Requirements parameter on the A-ASSOCIATE primitives. The session functional units are described in ITU-T Rec. X.215 | ISO/IEC 8326.