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Technologies de l'information — Interconnexion des systèmes ouverts — Protocole en mode connexion pour l'élément de service de contrôle d'association des objets de service d'application

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Information technology — Open Systems Interconnection — Connection-mode protocol for the Application Service Object Association Control Service Element

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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 committeesestablished 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 15954 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.227 bis.

This first edition of ISO/IEC 15954 cancels and replaces ISO/IEC 8650-1:1999 and its Amendment 1:1997 and Amendment 2:1998, of which it constitutes a technical revision.

Annexes A to D form a normative part of this International Standard. Annex E is for information only.

Introduction

This Recommendation | International Standard is one of a set of ITU-T Recommendations | 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 area of standardization for interconnection into a series of layers of specification, each of manageable size.

The goal of Opens 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 Recommendation | International Standard specifies the connection-mode protocol for the application service element for ASO-association control: the Association Control Service Element (ACSE). The protocol for ACSE connectionless mode service (A-UNIT-DATA) is specified in ITU-T Rec. X.237 *bis* | ISO/IEC 15955. The ACSE provides services for establishing and releasing associations. The ACSE protocol includes three 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 ASO-context during association establishment. The optional Higher Level Association functional unit provides for the facility to identify ASO-associations and transparently pass data to child ASOs and allows the ASO-context or the presentation context on an ASO-association to be modified during the lifetime of the association.

The fast-associate mechanism allows a session connection, including its embedded presentation connection and application association, to be established using a compressed form of the information that would otherwise be sent on the S-CONNECT exchange. The compressed form, called the upper layer context identifier, is a reference to an upper-layer context specification, which is a definition of the fields of the application, ACSE, presentation, and session protocols that would be sent on the full-form connect messages. The upper-layer context identifier may be parameterized to include values for variable fields allowed by the full form protocols for the upper layers.

Within the ACSE protocol, the addition is the definition of the construction of the User summary parameter of the P-CONNECT primitives from the semantics of the AARQ fields and the User summary parameter of the corresponding A-ASSOCIATE primitive.

This Recommendation | International Standard maintains compatibility with earlier editions of ACSE. This Recommendation | International Standard does not support X.410 mode nor Session Version 1.

This Recommendation | International Standard 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 Recommendation | International Standard is also governed by the use of the Presentation service (see ITU-T Rec. X.216 | ISO/IEC 8822).

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – CONNECTION-MODE PROTOCOL FOR THE APPLICATION SERVICE OBJECT ASSOCIATION CONTROL SERVICE ELEMENT

1 Scope

The ACSE supports two modes of communication: connection-mode and connectionless-mode. The ACSE service definition (see ITU-T Rec. X.217 *bis* | ISO/IEC 15953) includes both modes of communication. This Recommendation | International Standard only includes the connection mode of communication. This Recommendation | International Standard for the connectionless mode of communication is contained in ITU-T Rec. X.237 *bis* | ISO/IEC 15955.

This Recommendation | International Standard defines procedures that are applicable to instances of communication between systems which wish to interconnect in an open systems interconnection environment in a connection mode. This Recommendation | International Standard includes the Kernel functional unit that is used to establish and release ASO-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 ASO-context negotiation functional unit provides the additional facility for the recipient to select the ASO-context from a list offered by the initiator during association establishment. The optional Higher Level Association functional unit provides for the facility to identify ASO-associations and transparently pass data to child ASOs and allows the ASO-context or the presentation context on an ASO-association to be modified during the lifetime of the association.

This Recommendation | International Standard specifies:

a) procedures for the transfer of information for ASO-association control and the authentication of ASOs and application-entities; and

b) the abstract syntax for the representation of the ACSE APDUs.

The ACSE procedures are defined in terms of:

a) the interactions among peer ACSE protocol machines through the use of Presentation services or supporting ACSE services; and

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

This Recommendation | International Standard 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 this 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 (1995) | ISO/IEC 8326:1996, *Information technology – Open Systems Interconnection – Session service definition.*
- ITU-T Recommendation X.215 (1995)/Amd.1 (1997) | ISO/IEC 8326:1996/Amd.1:1998, *Information technology – Open Systems Interconnection – Session service definition – Amendment 1: Efficiency enhancements.*
- ITU-T Recommendation X.215 (1995)/Amd.2 (1997) | ISO/IEC 8326:1996/Amd.2:1998, *Information technology – Open Systems Interconnection – Session service definition – Amendment 2: Nested connections functional unit.*
- ITU-T Recommendation X.216 (1994) | ISO/IEC 8822:1994, *Information technology – Open Systems Interconnection – Presentation service definition.*
- ITU-T Recommendation X.216 (1994)/Amd.1 (1997) | ISO/IEC 8822:1994/Amd.1:1998, *Information technology – Open Systems Interconnection – Presentation service definition – Amendment 1: Efficiency enhancements.*
- ITU-T Recommendation X.216 (1994)/Amd.2 (1997) | ISO/IEC 8822:1994/Amd.2:1998, *Information technology – Open Systems Interconnection – Presentation service definition – Amendment 2: Nested connections functional unit.*
- ITU-T Recommendation X.217 *bis* (1998) | ISO/IEC 15953:1999, *Information technology – Open Systems Interconnection – Service definition for the application service object – 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.225 (1995)/Amd.1 (1997) | ISO/IEC 8327-1:1996/Amd.1:1998, *Information technology – Open Systems Interconnection – Connection-oriented session protocol: Protocol specification – Amendment 1: Efficiency enhancements.*
- ITU-T Recommendation X.225 (1995)/Amd.2 (1998) | ISO/IEC 8327-1:1996/Amd.2:1998, *Information technology – Open Systems Interconnection – Connection-oriented session protocol: Protocol specification – Amendment 2: Nested connections functional unit.*
- ITU-T Recommendation X.226 (1994) | ISO/IEC 8823-1:1994, *Information technology – Open Systems Interconnection – Connection-oriented presentation protocol: Protocol specification.*
- ITU-T Recommendation X.226 (1994)/Amd.1 (1997) | ISO/IEC 8823-1:1994/Amd.1:1998, *Information technology – Open Systems Interconnection – Connection-oriented presentation protocol: Protocol specification – Amendment 1: Efficiency enhancements.*
- ITU-T Recommendation X.226 (1994)/Amd.2 (1997) | ISO/IEC 8823-1:1994/Amd.2:1998, *Information technology – Open Systems Interconnection – Connection-oriented presentation protocol: Protocol specification – Amendment 2: Nested connections functional unit.*
- ITU-T Recommendation X.237 *bis* (1998) | ISO/IEC 15955:1999, *Information technology – Open Systems Interconnection – Connectionless protocol for the application service Object-Association control service element.*
- ITU-T Recommendation X.501 (1993) | ISO/IEC 9594-2:1995, *Information technology – Open Systems Interconnection – The Directory: Models.*
- ITU-T Recommendation X.650 (1996) | ISO/IEC 7498-3:1997, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing.*
- 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.680 (1994) | ISO/IEC 8824-1:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*

– ITU-T Recommendation X.680 (1994)/Amd.1 (1995) | ISO/IEC 8824-1:1995/Amd.1:1996 *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation – Amendment 1: Rules of extensibility.*

– ITU-T Recommendation X.681 (1994) | ISO/IEC 8824-2:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*

– ITU-T Recommendation X.681 (1994)/Amd.1 (1995) | ISO/IEC 8824-2:1995/Amd.1:1996, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification – Amendment 1: Rules of extensibility*.

– ITU-T Recommendation X.682 (1994) | ISO/IEC 8824-3:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*

– ITU-T Recommendation X.683 (1994) | ISO/IEC 8824-4:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*

– ITU-T Recommendation X.691 (1995) | ISO/IEC 8825-2:1996, *Information technology – ASN.1 Encoding Rules: Specification of Packed Encoding Rules (PER).*

2.2 Paired Recommendations | International Standards equivalent in technical content

– CCITT Recommendation X.209 (1988), *Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)*.

ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.

– CCITT Recommendation X.800 (1991), *Security architecture for Open Systems Interconnection for CCITT applications*.

ISO 7498-2:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 2: Security Architecture*.

2.3 Additional references

– ISO 6523:1984, *Data interchange – Structures for the identification of organizations*.

3 Definitions

3.1 Reference Model definitions

3.1.1 Basic Reference Model definitions

This Recommendation | International Standard 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) concrete syntax;

j) session-service;

k) session-protocol; and

l) session-connection.

3.1.2 Security architecture definitions

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

– password.

3.1.3 Naming and addressing definitions

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.650 | ISO/IEC 7498-3:

a) application-process title;

b) application-entity qualifier;

c) application-entity title;[1)]

d) application-process invocation-identifier;

e) application-entity invocation-identifier; and

f) presentation address.

3.2 Service conventions definitions

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

a) service-provider;

b) service-user;

c) confirmed service;

d) non-confirmed service;

e) provider-initiated service;

f) primitive;

g) request (primitive);

h) indication (primitive);

i) response (primitive);

j) confirm (primitive);

k) submit (primitive); and

l) deliver (primitive).

3.3 Presentation service definitions

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

a) abstract syntax;

b) abstract syntax name;

c) default context;

d) defined context set;

e) functional unit [presentation];

f) presentation context;

g) presentation data value.

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1) As defined in ITU-T Rec. X.650 | ISO/IEC 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.

3.4 Application Layer Structure definitions

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

a) ASO-context;
b) application-entity invocation;
c) control function;
d) application-service-object (ASO);
e) ASO-association;
f) ASO-association-identifier;
g) ASO-invocation;
h) ASOI-identifier;
i) ASOI-tag;
j) ASO-name;
k) ASO-qualifier;
l) ASO-title;
m) child ASO; and
n) parent ASO.

3.5 ACSE service definitions

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.217 *bis* | ISO/IEC 15953:

a) Association Control Service Element;
b) ACSE service-user;
c) ACSE service-provider;

d) requestor;
e) acceptor;
f) association-initiator;
g) association-responder;
h) authentication;
i) authentication-function;
j) authentication-value;
k) authentication-mechanism;
l) disrupt;
m) establishment phase; and
n) data transfer phase.

3.6 Association Control protocol specification definitions

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

3.6.1 Association Control Protocol Machine: The protocol machine for the Association Control Service Element specified in this Recommendation | International Standard.

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

4.2 Types of application-protocol-data-units

The following abbreviations have been given to the application-protocol-data-units defined in this Recommendation | International Standard:

AARE A-ASSOCIATE-RESPONSE APDU

AARQ A-ASSOCIATE-REQUEST APDU

ABRT A-ABORT APDU

ACRP A-ALTER-CONTEXT-RESPONSE APDU

ACRQ A-ALTER-CONTEXT-REQUEST APDU

A-DT A-DATA APDU

RLRE A-RELEASE-RESPONSE APDU

RLRQ A-RELEASE-REQUEST APDU

4.3 Other abbreviations

The following abbreviations are also used in this Recommendation | International Standard:

ACPM Association Control Protocol Machine

ACSE Association Control Service Element

AE application-entity

AEI application-entity invocation

Amd. Amendment of an ITU-T Recommendation and of an International Standard

AP application-process

APCI application-protocol-control-information

ASE application-service-element

ASN.1 Abstract Syntax Notation One

ASO application-service-object

ASOI ASO-invocation

CF control function

cnf confirm primitive

ind indication primitive

IEC International Electrotechnical Commission

ISO International Organization for Standardization

ITU-T International Telecommunications Union – Telecommunications Standardization Sector

OSI Open Systems Interconnection

QoS Quality of Service

Rec. Recommendation [ITU-T]

req request primitive

ROA Recognized Operating Agency

5 Conventions

This Recommendation | International Standard 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:

ACPM	Source or sink is the ACPM
cnf	Sink is related confirm primitive
ind	Sink is related indication primitive
M	Presence is mandatory
O	Presence is ACPM option
req	Source is related request primitive
rsp	Source is related response primitive
U	Presence is ACSE service-user option

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

6 Overview of the protocol

6.1 Service provision

The protocol in this Recommendation | International Standard provides the connection-mode services defined in ITU-T Rec. X.217 *bis* | ISO/IEC 15953. Both the connection-mode and connectionless-mode services are listed in Table 1. The protocol for the connectionless A-UNIT-DATA service is specified in ITU-T Rec. X.237 *bis* | ISO/IEC 15955.

Table 1 – ACSE services

Communication mode	Service	Type
Connection	A-ASSOCIATE	Confirmed
	A-RELEASE	Confirmed
	A-ABORT	Non-confirmed
	A-P-ABORT	Provider-initiated
	A-DATA	Non-confirmed
	A-ALTER-CONTEXT	Confirmed
Connectionless	A-UNIT-DATA	Non-confirmed

6.2 Functional units

Functional units are used by this Recommendation | International Standard to negotiate ACSE user requirements during association establishment. Four functional units are defined:

a) Kernel functional unit;

b) Authentication functional unit;

c) ASO-context negotiation functional unit; and

d) Higher Level Association functional unit.

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, ASO-context negotiation functional unit, and Higher Level Association 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, and RLRQ APDUs. The selection of the ASO-Context negotiation functional unit supports an additional field on the AARQ. Neither functional unit affects the elements of procedure. The optional Higher Level Association functional unit provides for the facility to identify ASO-associations and transparently pass data to child ASOs and allows the ASO-context or the