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Draft for Development

Open Systems Interconnection: specification of protocols for common application service elements: association control (ISO/DIS 8650/2)

Projet à développer. Interconnexion de systèmes ouverts: spécification des protocoles pour les éléments communs du service d'application: contrôle d'association.

Entwurf zur weiteren Ausarbeitung. Kommunikation Offener Systeme: Spezifikation der Protokolle der Bedienungselemente für allgemeine Anwendung: Assoziationssteuerung

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This publication is not to be regarded as a British Standard. It is being issued in the Draft for Development series of publications and is of a provisional nature because the subject matter is in the process of ongoing development within the International Standards Committee (ISO/TC 97/SC 21 Information Retrieval, Transfer and Management for Open Systems Interconnection).

It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

A review of this Draft for Development will be carried out not later than two years after its publication. Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development will be made in an announcement in the appropriate issue of *BSI News*. Observations which it is felt should receive attention before the official call for comments will be welcomed.

According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

National foreword

This Draft for Development has been prepared under the direction of the Office and Information Standards Committee. The primary objective of this Draft for Development is to give advance guidance to product and systems designers concerned with the Application Layer of the Basic Reference Model for Open Systems Interconnection (OSI).

The text of the Draft for Development is identical with that submitted to the International Organization for Standardization (ISO) for issue as ISO/DIS 8650/2 (reference ISO/TC 97/SC 21 N 882 rev).

For ease of reproduction the ISO text has been reproduced unchanged.

The UK has actively participated through BSI Technical Committee IST/21 in the development of the Draft International Standard. The Technical Committee will review any agreed amendments or addenda to the ISO text and will, where appropriate, update the text of this Draft for Development via an amendment or revision. When the ISO Draft reaches an appropriate level of agreement and stability, this Draft for Development may then be converted to a British Standard.

ISO/DIS 8650/2 is intended to form Part of an eventual multi-Part International Standard specifying protocols for the Common Application Service Elements:

Part 1 Introduction

Part 2 Association control

Part 3 Commitment, concurrency and recovery

Part 1 is not yet available as a Draft for Development. Part 3 has been published as DD 110. It is intended that additional Parts will be prepared when the need for further Common Application Service Elements has been identified.

The services provided by the protocols defined in the Parts of the International Standard will be defined in the corresponding Parts of ISO 8649. In particular, the closely related DD 131 (ISO/DIS 8649/2) defines the service provided by the protocol specified in this Draft for Development.

A brochure giving details of existing and projected British Standards publications for Open Systems Interconnection (OSI) may be obtained from the Sales Department, BSI, Linford Wood, Milton Keynes, MK14 6LE, at no charge.

Press releases for new OSI, data communications, database, and computer graphics British Standards publications will be issued to the computing press, and details of all new publications will be recorded in full in *BS/News*.

Terminology and conventions. The text of the Draft International Standard has been approved as suitable for publication as a Draft for Development without deviation. Some terminology and certain conventions are not identical with those used in Drafts for Development; attention is drawn especially to the following.

Wherever the words 'part of ISO 8650' appear, referring to this Draft for Development, they should be read as 'Draft for Development'.

Cross-references

International Standards	Corresponding British Standards
ISO 7498-1984	BS 6568 : 1984 Description of basic reference model for open systems interconnection (Identical)
ISO/DIS 8326 revised	DD 111 : 1985 Open Systems Interconnection: basic connection-oriented session service definition (ISO/DIS 8326 revised) (Identical)
ISO/DTR 8509	DD 108 : 1986 Open Systems Interconnection: service conventions (ISO/DTR 8509) (Identical)
ISO/DIS 8649/2	DD 131 : 1986 Open Systems Interconnection: definition of common application service elements: association control (ISO/DIS 8649/2) (Identical)
ISO/DIS 8822	DD 101 : 1986 Open Systems Interconnection: connection-oriented presentation service definition (ISO/DIS 8822) (Identical)
ISO/DIS 8824.2	DD 103 : 1986 Open Systems Interconnection: specification of Abstract Syntax Notation One (ASN. 1) (ISO/DIS 8824.2) (Identical)

0 Introduction

0.1 This part of ISO 8650 is one of a set of International Standards produced to facilitate the interconnection of information processing systems. It is related to other International Standards in the set as defined by the Reference Model for Open Systems Interconnection (ISO 7498). The reference model subdivides the area of standardization for interconnection into a series of layers of specification, each of manageable size.

0.2 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.

0.3 This part of ISO 8650 specifies the protocol for the common application-service-element for application-association control: the Association Control Service Element (ACSE). The ACSE provides services for the establishment and termination of application-associations. These services are intended to be applicable to a wide range of application-process communication requirements.

0.4 This part of ISO 8650 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).

1 Scope and field of application

1.1 This part of ISO 8650 specifies:

- a) procedures for the transfer of information, relating to application-association control, between application-entities; and

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

1.2 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.

1.3 These procedures are applicable to instances of communication between systems which wish to interconnect in an open systems interconnection environment.

1.4 This part of ISO 8650 also specifies conformance requirements for systems implementing these procedures. It does not contain tests which can be used to demonstrate conformance.

2 References

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

ISO 8326, *Information processing systems—Open Systems Interconnection—Basic connection oriented session service definition*.

ISO/TR 8509, *Information processing systems—Open Systems Interconnection—Service conventions*.

ISO 8649/2, *Information processing systems—Open Systems Interconnection—Service definition for common application-service-elements—Part 2: Association control*.¹

ISO 8822, *Information processing systems—Open Systems Interconnection—Connection oriented presentation service definition*.¹

ISO 8824, *Information processing systems—Open Systems Interconnection—Specification of Abstract Syntax Notation One (ASN.1)*.¹

¹ At present at the stage of draft

3 Definitions

3.1 Reference model definitions

This part of ISO 8650 is based on the concepts developed in ISO 7498 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) presentation-service;
- g) presentation-connection;
- h) session-service; and
- i) session-connection;

3.2 Service conventions definitions

This part of ISO 8650 makes use of the following terms defined in ISO/TR 8509:

- a) service-provider;
- b) service-user;
- c) confirmed service;
- d) unconfirmed service;
- e) provider-initiated service;
- f) primitive;
- g) request (primitive);
- h) indication (primitive);
- i) response (primitive); and
- j) confirm (primitive).

3.3 ACSE-service definitions

This part of ISO 8650 makes use of the following terms defined in ISO 8649/2:

- a) application-association; association;
- b) application context;
- c) application-entity title;
- d) Association Control Service Element;
- e) requestor; and
- f) responder.

3.4 Association Control protocol specification definitions

The following terms are introduced in this part of ISO 8650.

Association Control Protocol Machine: The protocol machine for the Association Control Service Element specified in this part of ISO 8650.

Requesting Association Control Protocol Machine: The Association Control Protocol Machine whose service-user is the requestor of a particular Association Control Service Element service.

Responding Association Control Protocol Machine: The Association Control Protocol Machine whose service-user is the responder for a particular Association Control Service Element service.

4 Symbols and abbreviations

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 part of ISO 8650.

AARQ	A-ASSOCIATE-REQUEST application-protocol-data-unit
AARE	A-ASSOCIATE-RESPONSE application-protocol-data-unit
RLRQ	A-RELEASE-REQUEST application- protocol-data-unit
RLRE	A-RELEASE-RESPONSE application- protocol-data-unit
ABRT	A-ABORT application-protocol-data- unit

4.3 Other abbreviations

The following abbreviations are used in this part of ISO 8650.

ACPM	Association Control Protocol Machine
ACSE	Association Control Service Element
AE	application-entity
ASE	application-service-element
ASN.1	Abstract Syntax Notation One
PCI	protocol-control-information

5 Conventions

5.1 This part of ISO 8650 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
U	presence is an ACSE service-user option
req	source is related request primitive
ind	sink is related indication primitive
rsp	source is related response primitive
cnf	sink is related confirm primitive
sp	source or sink is the ACPM

5.2 The structure of each ACSE APDU is specified in clause 9 using the abstract syntax notation of ASN.1 (ISO 8824).

6 Overview of the protocol

6.1 Service provision

The protocol specified in this part of ISO 8650 provides the services defined in ISO 8649/2. These services are listed in table 1.

6.2 Use of the presentation-service

6.2.1 The ACSE protocol specified in this part of ISO 8650 uses the Kernel functional unit of the presentation-service (ISO 8822) to pass information, in the form of ACSE APDUs, between peer application-entities (AEs).

6.2.2 This part of ISO 8650 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-services.

6.2.3 During the lifetime of an association, the underlying presentation connection either uses a single presentation context or multiple presentation contexts as part of the presentation multiple defined context facility. The choice is determined by the use of the Single Presentation Context parameter of the A-ASSOCIATE service as described in 8.1.2 and 8.1.3.

6.3 Relationship to the session-service

6.3.1 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 responder. They accomplish this using the Session Requirements parameter on the A-ASSOCIATE primitives. The session functional units are described in ISO 8326.

6.3.2 The choice of session functional units affects the A-RELEASE service in the following ways because of procedures defined in ISO 8326:

- a) if any session functional units are selected that involve the use of session tokens, the requestor of the A-RELEASE service is required to own all of the tokens at the time of the request; and
- b) the A-RELEASE service responder may only refuse the release request if the Negotiated Release functional unit was selected.

Table 1 — Service summary

SERVICE	TYPE
A-ASSOCIATE	Confirmed
A-RELEASE	Confirmed
A-ABORT	Unconfirmed
A-P-ABORT	Provider-initiated

6.4 Model

6.4.1 The association control protocol machine (ACPM) within the ACSE communicates with its service-user by means of primitives defined in ISO 8649/2. Each invocation of the ACPM controls a single association.

6.4.2 The ACPM is driven by the use of ACSE-service request and response primitives from its service-user and by presentation-service indication and confirm primitives. The ACPM, in turn, issues presentation-service request and response primitives for the underlying presentation-connection that supports the association.

6.4.3 The reception of an ACSE-service or a presentation-service primitive and the generation of dependent actions are considered to be an indivisible action.

6.4.4 During the establishment of an association, the existence of both the requesting and responding AEs is presumed. How these AEs are created is outside of this part of ISO 8650.

NOTE — Each association may be identified in an end system by an internal, implementation dependent mechanism so that the ACSE service-user and the ACPM can refer to it.

7 Elements of procedure

7.0.1 The ACSE protocol consists of the following elements of procedure:

- a) association establishment;
- b) normal release of an association; and
- c) abnormal release of an association.

7.0.2 In this clause, a summary of each of these elements of procedure is presented. This consists of a summary of the relevant APDUs, and a high-level overview of the relationship between the ACSE-service primitives, the APDUs involved, and the presentation-service that is used. Clause 8 describes how the parameters of the presentation-service primitives are used. In clause 9, a detailed specification of the ACSE APDUs is given using the notation of ASN.1 ISO 8824. Annex A presents the state table for the ACPM.

7.1 Association establishment

7.1.1 Purpose

The association establishment procedure is used to establish an association between two AEs. It supports the A-ASSOCIATE service.

7.1.2 APDUs used

The association establishment procedure uses the A-ASSOCIATE-REQUEST (AARQ) and the A-ASSOCIATE-RESPONSE (AARE) APDUs.

7.1.2.1 AARQ APDU

The fields of the AARQ APDU are listed in table 2.

Table 2 — AARQ APDU fields

Field name	Presence	Source	Sink
Protocol Version	M	sp	sp
Called Application-Entity Title	U	req	ind
Calling Application-Entity Title	U	req	ind
Application Context Name	M	req	ind
User Information	U	req	ind

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This publication is a Draft for Development and is therefore not to be regarded as a British Standard. See page 1.

7.1.2.2 AARE APDU

The fields of the AARE APDU are listed in table 3.

Table 3 — AARE APDU fields

Field name	Presence	Source	Sink
Protocol Version	M	sp	sp
Result	M	rsp ²	cnf
Responding Application-Entity Title	U	rsp	cnf
Application Context Name	M	rsp	cnf
User Information	U	rsp	cnf

7.1.3 Association establishment procedure

This procedure is driven by the following events:

- an A-ASSOCIATE request primitive from the requestor;
- an AARQ APDU as user data on an P-CONNECT indication primitive;
- an A-ASSOCIATE response primitive from the responder; and
- a P-CONNECT confirm primitive (that may or may not contain an AARE APDU);

7.1.3.1 A-ASSOCIATE request primitive

7.1.3.1.1 The requesting ACPM forms an AARQ APDU from parameter values of the A-ASSOCIATE request primitive and its stored data (the Protocol Version field). It issues a P-CONNECT request primitive also using information from the A-ASSOCIATE request primitive. The User Data parameter of the P-CONNECT request primitive contains the AARQ APDU.

7.1.3.1.2 The requesting ACPM waits for a primitive from the presentation service-provider and does not accept any other primitive from the requestor other than an A-ABORT request primitive.

7.1.3.2 AARQ APDU

7.1.3.2.1 The responding ACPM receives an AARQ APDU from its peer as user data on a P-CONNECT indication primitive. If any of the parameters of the P-CONNECT indication primitive or the fields in the AARQ APDU are unacceptable to this ACPM, it forms an AARE APDU with the appropriate rejecting Result field. It sends the AARE APDU as user data on a P-CONNECT response primitive. The Result param-

eter on the P-CONNECT response primitive specifies "user-rejection". The ACPM does not issue an A-ASSOCIATE indication primitive to the responder. The association is not established.

7.1.3.2.2 If the P-CONNECT indication primitive and its AARQ APDU are acceptable to the responding ACPM, it issues an A-ASSOCIATE indication primitive to the responder. The A-ASSOCIATE indication primitive parameters are derived from the AARQ APDU and from the P-CONNECT indication primitive. The ACPM waits for a primitive from the responder.

7.1.3.3 A-ASSOCIATE response primitive

7.1.3.3.1 When the ACPM receives the A-ASSOCIATE response primitive, the Result parameter specifies whether the responder has accepted or rejected the association. The ACPM forms an AARE APDU using the A-ASSOCIATE response primitive parameters. The AARE APDU is sent as the User Data parameter on the P-CONNECT response primitive.

7.1.3.3.2 If the responder accepted the association request, the Result parameter on the related P-CONNECT response primitive specifies "acceptance", and the Result field of the outgoing AARE APDU also specifies "accepted". The association is established.

7.1.3.3.3 If the responder rejected the association request, the Result parameter on the related P-CONNECT response primitive specifies "user-rejection", and the Result field of the AARE APDU contains the appropriate rejection value. The association is not established.

² Normally supplied by the A-ASSOCIATE response primitive. However, if the responding ACPM rejects the AARQ APDU, then the ACPM supplies the value for the field.

7.1.3.4 P-CONNECT confirm primitive

7.1.3.4.1 The requesting ACPM receives a P-CONNECT confirm primitive. The following situations are possible:

- a) the association has been accepted;
- b) the responding ACPM or the responder has rejected the association; or
- c) the presentation service-provider has rejected the related presentation connection.

7.1.3.4.2 If the association was accepted, the P-CONNECT confirm primitive Result parameter specifies "acceptance". The User Data parameter contains an AARE APDU. The Result field of the AARE APDU also specifies "accepted". The requesting ACPM issues an A-ASSOCIATE confirm primitive to the requestor based on parameters from the P-CONNECT confirm primitive and from the AARE APDU. The A-ASSOCIATE confirm primitive Result parameter specifies "accepted". The association is established.

7.1.3.4.3 If the association was rejected by either the responding ACPM or by the responder, the related P-CONNECT confirm primitive Result parameter specifies "user-rejection". The User Data parameter contains an AARE APDU. The Result field of the AARE APDU indicates the reason for the rejection. The requesting ACPM issues an A-ASSOCIATE confirm primitive to the requestor based on parameters from the P-CONNECT confirm primitive and the AARE APDU. The A-ASSOCIATE confirm primitive Result parameter contains the appropriate rejection value. The association is not established.

7.1.3.4.4 If the presentation-connection was rejected by the presentation service-provider, the P-CONNECT confirm primitive Result parameter specifies "provider-rejection(transient)" or "provider-rejection(permanent)". In this situation, the User Data field is not used by the requesting ACPM. The requesting ACPM issues an A-ASSOCIATE confirm primitive with the appropriate Result parameter. The association is not established.

7.1.4 Use of the AARQ APDU fields

The AARQ APDU fields are used as follows.

7.1.4.1 Protocol Version

This identifies the version of the protocol in use by the requesting ACPM. The value is 1.

7.1.4.2 Called Application-Entity Title

This is the Called Application-Entity Title parameter on the A-ASSOCIATE request primitive. It appears as the Called Application-Entity Title parameter on the A-ASSOCIATE indication primitive, if issued.

7.1.4.3 Calling Application-Entity Title

This is the Calling Application-Entity Title parameter from the A-ASSOCIATE request primitive. It appears as the Calling Application Entity Title parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.4 Application Context Name

This is the Application Context Name parameter from the A-ASSOCIATE request primitive. It appears as the Application Context Name parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.5 User Information

This is the User Information parameter from the A-ASSOCIATE request primitive. It appears as the User Information parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.5 Use of the AARE APDU fields

The AARE APDU fields are used as follows.

7.1.5.1 Protocol Version

This identifies the version of the protocol in use by the responding ACPM. The value is 1.

7.1.5.2 Result

If the AARQ APDU was rejected by the responding ACPM (i.e., an A-ASSOCIATE indication primitive was not issued to the responder), this field is supplied by the responding ACPM. Otherwise, this field is the Result parameter from the A-ASSOCIATE response primitive. In either situation, it appears as the Result parameter on the A-ASSOCIATE confirm primitive. This field can take one of the following symbolic values:

- accepted;
- rejected by responder(reason not specified);
- rejected by responder(transient);
- rejected by responder(permanent);
- rejected by responder(AE title not recognized);
- rejected by responder(application context name not supported); or
- rejected by responding ACPM.

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