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

*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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Printed in Switzerland

CONTENTS

	<i>Page</i>
1 Scope	1
2 Normative references.....	1
2.1 Identical Recommendations International Standards.....	1
2.2 Paired Recommendations International Standards equivalent in technical content.....	3
2.3 Additional references	3
3 Definitions	3
3.1 Reference Model definitions	3
3.1.1 Basic Reference Model definitions	3
3.1.2 Security architecture definitions.....	4
3.1.3 Naming and addressing definitions	4
3.2 Service conventions definitions.....	4
3.3 Presentation service definitions.....	4
3.4 Application Layer Structure definitions	5
3.5 ACSE service definitions	5
3.6 Association Control protocol specification definitions	5
4 Abbreviations	6
4.1 Data units.....	6
4.2 Types of application-protocol-data-units	6
4.3 Other abbreviations	6
5 Conventions.....	7
6 Overview of the protocol.....	7
6.1 Service provision.....	7
6.2 Functional units.....	7
6.3 Use of supporting services	9
6.4 Model	10
6.5 User summary mechanism.....	10
7 Elements of procedure	11
7.1 Association establishment	11
7.1.1 Purpose.....	11
7.1.2 APDUs used	11
7.1.3 Association establishment procedure	11
7.1.4 Use of the AARQ APDU fields	14
7.1.5 Use of the AARE APDU fields.....	18
7.1.6 Collisions and interactions	20
7.2 Normal release of an association.....	21
7.2.1 Purpose.....	21
7.2.2 APDUs used	21
7.2.3 Normal release procedure.....	21
7.2.4 Use of the RLRQ APDU fields	23
7.2.5 Use of the RLRE APDU fields.....	23
7.2.6 Collisions and disruptions	24
7.3 Abnormal release of an association.....	24
7.3.1 Purpose.....	24
7.3.2 APDUs used	24
7.3.3 Abnormal release procedure.....	24
7.3.4 Use of the ABRT APDU fields	25
7.3.5 Collisions and interactions	26

	<i>Page</i>
7.4	A-DATA 26
7.4.1	Purpose 26
7.4.2	APDUs used 26
7.4.3	A-DATA procedure 26
7.4.4	Use of the A-DT APDU fields 26
7.5	A-ALTER-CONTEXT 27
7.5.1	Purpose 27
7.5.2	APDUs used 27
7.5.3	A-ALTER-CONTEXT procedure 27
7.5.4	A-ALTER-CONTEXT-REQUEST procedure 27
7.5.5	Use of the ACRQ fields 28
7.5.6	Use of the ACRP fields 28
7.6	Rules for extensibility 29
8	Supporting Service Definition assumed by ACSE 29
8.1	IA-BIND 30
8.1.1	IA-BIND request 30
8.1.2	IA-BIND-REQUEST.deliver 30
8.1.3	IA-BIND request Parameters 31
8.1.4	IA-BIND response 31
8.1.5	IA-BIND-RESPONSE.deliver 32
8.1.6	IA-BIND response Parameters 32
8.2	IA-DATA 32
8.2.1	IA-DATA.submit 32
8.2.2	IA-DATA.deliver 32
8.2.3	IA-DATA Parameters 32
8.3	IA-ALTER-CONTEXT (optional) 32
8.3.1	IA-ALTER-CONTEXT-REQUEST.submit 32
8.3.2	IA-ALTER-CONTEXT-REQUEST.deliver 33
8.3.3	IA-ALTER-CONTEXT-RESPONSE.submit 33
8.3.4	IA-ALTER-CONTEXT-RESPONSE.deliver 33
8.3.5	IA-ALTER-CONTEXT Parameters 33
8.4	IA-ABORT 33
8.4.1	IA-ABORT.submit 33
8.4.2	IA-ABORT.deliver 33
8.4.3	IA-ABORT Parameters 34
8.5	IA-RELEASE 34
8.5.1	IA-RELEASE-REQUEST.submit 34
8.5.2	IA-RELEASE-REQUEST.deliver 34
8.5.3	IA-RELEASE-ACCEPT.submit 34
8.5.4	IA-RELEASE-REFUSE.submit 34
8.5.5	IA-RELEASE-ACCEPT.deliver 34
8.5.6	IA-RELEASE-REFUSE.submit 35
8.6	IA-UNBIND 35
8.6.1	IA-UNBIND.submit 35
8.6.2	IA-UNBIND.deliver 35
8.6.3	IA-UNBIND Parameters 35
9	Syntax of ACSE 35
9.1	Structure of ACSE APDUs 35
10	Conformance 41
10.1	Statement requirements 41
10.2	Static requirements 41
10.3	Dynamic requirements 42
11	Precedence 42

	<i>Page</i>
12 Registration requirements.....	42
12.1 Application titles	42
12.2 ASO-context.....	43
12.3 Authentication-mechanism.....	43
12.4 Upper-layer context specifications	43
Annex A – ACPM state table.....	44
A.1 General	44
A.2 Conventions.....	44
A.3 Actions to be taken by the ACPM.....	44
A.3.1 Invalid intersections	45
A.3.2 Valid intersections.....	45
A.4 Relationship to Presentation and other ASEs	45
Annex B – Authentication-mechanism using password	48
B.0 Introduction	48
B.1 Assigned name	48
B.2 Authentication-value ASN.1 datatype.....	48
B.3 Processing specification	48
B.3.1 Requesting authentication	48
B.3.2 Performing authentication	48
Annex C – Definition of the IA-service mapping to the Presentation service.....	50
C.1 Procedures for Lower Boundary Mapping the Presentation service	50
C.2 Use of the Presentation service	50
C.2.1 General	50
C.2.2 Nested associations.....	50
C.3 Use of the Session service	50
C.3.1 General	50
C.3.2 Disruption of A-RELEASE by external event	51
C.4 Mapping to Presentation service	51
C.4.1 IA-BIND-REQUEST.submit	51
C.4.2 IA-BIND-REQUEST.deliver (P-CONNECT indication)	51
C.4.3 IA-BIND-RESPONSE.submit	51
C.4.4 IA-BIND-RESPONSE.deliver	51
C.4.5 IA-DATA.submit	51
C.4.6 IA-DATA.deliver (P-DATA indication, P-RESYNCHRONIZE, P-U-EXCEPTION REPORT, P-P-EXCEPTION REPORT).....	52
C.4.7 A-ALTER-CONTEXT-REQUEST.submit.....	52
C.4.8 IA-ALTER-CONTEXT-REQUEST.deliver (P-ALTER-CONTEXT indication)	52
C.4.9 IA-ALTER-CONTEXT-RESPONSE.submit	52
C.4.10 IA-ALTER-CONTEXT-RESPONSE.deliver (P-ALTER-CONTEXT confirm).....	52
C.4.11 IA-ABORT.submit.....	52
C.4.12 IA-ABORT.deliver (P-U-ABORT indication).....	52
C.4.13 IA-RELEASE-REQUEST.submit (P-RELEASE request).....	52
C.4.14 IA-RELEASE-REQUEST.deliver (P-RELEASE indication)	52
C.4.15 IA-RELEASE-ACCEPT.submit [P-RELEASE (result = affirmative) response]	52
C.4.16 IA-RELEASE-ACCEPT.deliver [P-RELEASE confirm (accepted)]	52
C.4.17 IA-RELEASE-REFUSE.submit [P-RELEASE (result = negative) response]	53
C.4.18 IA-RELEASE-REFUSE.deliver [P-RELEASE confirm (accepted)].....	53
C.4.19 A-UNBIND.submit	53
C.4.20 IA-UNBIND.deliver (P-P-ABORT indication).....	53
Annex D – Definition of the IA-service mapping to ACSE	54
D.1 Procedures for lower boundary mapping to ACSE or the Presentation service	54
D.2 IA-BIND-REQUEST.submit	54
D.2.1 When Invoked	54
D.2.2 Action upon Receipt.....	54
D.3 IA-BIND-REQUEST.deliver (A-ASSOCIATE indication).....	55
D.3.1 When Invoked	55
D.3.2 Action upon Receipt.....	55

	<i>Page</i>
D.4 IA-BIND-RESPONSE.submit	55
D.4.1 When Invoked	55
D.4.2 Action upon Receipt.....	55
D.5 IA-BIND-RESPONSE.deliver (A-ASSOCIATE confirm).....	56
D.5.1 When Invoked	56
D.5.2 Action upon Receipt.....	56
D.6 IA-DATA.submit.....	56
D.6.1 When Invoked	56
D.6.2 Action upon Receipt.....	56
D.7 IA-DATA.deliver (A-DATA.deliver)	56
D.7.1 When Invoked	56
D.7.2 Action upon Receipt.....	56
D.8 IA-ALTER-CONTEXT-REQUEST.submit	56
D.8.1 When Invoked	56
D.8.2 Action upon Receipt.....	56
D.9 IA-ALTER-CONTEXT-REQUEST.deliver (A-ALTER-CONTEXT-REQUEST.deliver).....	56
D.9.1 When Invoked	56
D.9.2 Action upon Receipt.....	57
D.10 IA-ALTER-CONTEXT-RESPONSE.submit	57
D.10.1 When Invoked	57
D.10.2 Action upon Receipt.....	57
D.11 IA-ALTER-CONTEXT-RESPONSE.deliver (A-ALTER-CONTEXT-RESPONSE.deliver)	57
D.11.1 When Invoked	57
D.11.2 Action upon Receipt.....	57
D.11.3 IA-ALTER-CONTEXT Parameters	57
D.12 IA-ABORT.submit	57
D.12.1 When Invoked	57
D.12.2 Action upon Receipt.....	57
D.13 IA-ABORT.deliver (A-ABORT indication)	57
D.13.1 When Invoked	57
D.13.2 Action upon Receipt.....	58
D.14 IA-RELEASE-REQUEST.submit.....	58
D.14.1 When Invoked	58
D.14.2 Action upon Receipt.....	58
D.15 IA-RELEASE-ACCEPT.submit	58
D.15.1 When Invoked	58
D.15.2 Action upon Receipt.....	58
D.16 IA-RELEASE-REFUSE.submit	58
D.16.1 When Invoked	58
D.16.2 Action upon Receipt.....	58
D.17 IA-UNBIND.submit	58
D.17.1 When Invoked	58
D.17.2 Action upon Receipt.....	58
D.18 IA-UNBIND.deliver.....	59
D.18.1 When Invoked	59
D.18.2 Action upon Receipt.....	59
Annex E – Guidance on the use of Higher Level Association functional units	60
E.1 The application layer structure	60
E.2 Support for association establishment by an embedded ASO	60
E.2.1 Lower Boundary Service definitions.....	61
E.2.2 Requests for the establishment of associations.....	61
E.2.3 The Use of the Higher Level Association functional unit	62
E.3 Concept of operations.....	62
E.3.1 The ACSE Model	63
E.3.2 The A-DATA APDU	64
E.3.3 Syntax Negotiation	64
E.3.4 ASO-context.....	66
E.3.5 Naming and Addressing in the Application Layer	66

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.

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.

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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.

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

presentation context on an ASO-association to be modified during the lifetime of the association. Note that some higher level associations may have a scope that precludes the use of Session Functional Units other than Kernel and Full Duplex.

For details on the use of Higher Level Association functional units, see Annexes C, D, and E. Table 2 shows the services, APDUs and APDU fields associated with the ACSE functional units.

Table 2 – Functional Unit APDUs and their fields

Functional Unit	Service	APDU	Field Name
Kernel	A-ASSOCIATE	AARQ	Protocol Version ASO-context-name Calling AP-title Calling AE-qualifier Calling AP-invocation-identifier Calling AE-invocation-identifier Called AP-title Called AE-qualifier Called AP-invocation-identifier Called AE-invocation-identifier Implementation Information User-information Called ASOI-Tag Calling ASOI-Tag Presentation context definition list
		AARE	Protocol Version ASO-context-name Responding AP-title Responding AE-qualifier Responding AP-invocation-identifier Responding AE-invocation-identifier Result Result source – Diagnostic Implementation Information User-information Responding ASOI-Tag Presentation context result list
	A-RELEASE	RLRQ	Reason ASO-qualifier ASOI-identifier User-information
		RLRE	Reason ASO-qualifier ASOI-identifier User-information

Table 2 (concluded)

Functional Unit	Service	APDU	Field Name
Authentication	A-ASSOCIATE	ABRT	Reason ASO-qualifier ASOI-identifier User-information
		AARQ	ACSE requirements Authentication-mechanism Name Authentication-value
		AARE	ACSE requirements Authentication-mechanism Name Authentication-value
ASO-context-negotiation	A-ABORT	ABRT	Diagnostic
	A-ASSOCIATE	AARQ	ASO-context-name-list ACSE requirements
Higher Level Association	A-ASSOCIATE	AARE	ASO-context-name-list ACSE requirements
	A-DATA	A-DT	ASO-qualifier ASOI-identifier User data
	A-ALTER-CONTEXT	ACRQ	ASO-qualifier ASOI-identifier ASO-context P-context User data
		ACRP	ASO-qualifier ASOI-identifier ASO-context P-context User data

6.3 Use of supporting services

There are two distinct cases that must be considered in mapping ACSE to a supporting service:

- 1) ACSE may use a Presentation Connection as a supporting service; or
- 2) ACSE may use an ASO-association that is not an application-association, i.e. an ASO-association is being established over another ASO-association (which may be an application association) or any equivalent supporting service.

ACSE defines a service definition for a generic supporting service (called the IA-service, see clause 8) to define its mapping to a supporting service²⁾. Annexes to this Recommendation | International Standard specify mappings of this IA-service to specific supporting services, e.g. the Presentation service and the ACSE service. Other standards may define other mappings as required.

In the connectionless mode, the A-UNIT-DATA APDU may be mapped to either a connection-mode or connectionless-mode supporting service. If the higher-level functional unit is selected, all connection-mode ACSE APDUs can be mapped to the A-UNIT-DATA service primitives.

6.4 Model

The Association Control Protocol Machine (ACPM) is modeled as a finite state machine whose specification is given in this Recommendation | International Standard. The ACPM communicates with its service-user by means of the ACSE service primitives defined in ITU-T Rec. X.217 *bis* | ISO/IEC 15953. The ACPM communicates with its supporting service-provider by means of either the ACSE service or Presentation services defined in ITU-T Rec. X.216 | ISO/IEC 8822.

NOTE 1 – An application ASE or ASO specification that references ACSE need not specify the use of ACSE service primitive parameters that are irrelevant to its operation. The control function (CF) that references ACSE can be modeled to pass such parameters between the ACPM and that part of the ASOI to which the parameters are relevant.

The ACPM is driven by the receipt of input events from its ACSE service-user and from its service-provider that supports the association. The input events from the ACSE service-user are ACSE request and response primitives.

The ACPM responds to input events by issuing output events to its service-provider and to its ACSE service-user. The output events to its ACSE service-user are ACSE indication and confirm primitives.

The receipt of an input event, the generation of dependent actions, and the resultant output event are considered to be an indivisible action.

During the establishment of an association among ASOs, the existence of invocations of the requesting and responding ASOs is presumed. How they are created is outside of the scope of this Recommendation | International Standard.

A new invocation of an ACPM is employed upon the receipt of an A-ASSOCIATE request/indication primitive or a IA-BIND-REQUEST.deliver primitive. Each such invocation controls exactly one association.

NOTE 2 – Each association may be identified in an end system by a local mechanism so that the ACSE service-user and the ACPM can refer to the association.

When the ACPM is a component of the outermost ASO, an ACPM communicates with its peer ACPM in support of an association by transferring ACSE Application Protocol Data Units (APDUs) defined in clause 9. An ACSE APDU is transferred as the User data parameter of an A-DATA primitive or a value in the User data parameter of a service primitive of the supporting service.

6.5 User summary mechanism

If the fast associate mechanism is used during association establishment, the initiating ACPM as well as forming an AARQ APDU to be passed to the Presentation service-provider in the User data parameter of a P-CONNECT request, also passes the semantic content of the AARQ in the User summary parameter of the P-CONNECT request. The User summary parameter references an Upper-Layer Context specification and is a purely abstract parameter. If the A-ASSOCIATE request User-information parameter was present, the semantic content of this will have been supplied to the ACPM in the User summary parameter of the A-ASSOCIATE request, and is conceptually included in the User summary parameter of the P-CONNECT request.

If the Presentation provider (via the Session service and protocol) makes use of the fast associate mechanism, the responding ACPM will receive only the User summary parameter on the P-CONNECT indication, and not the User data. The responding implementation will reconstruct the semantic content of the AARQ that would have been present in the P-CONNECT User data, and issue an A-ASSOCIATE indication with a User summary parameter in place of its User data.

²⁾ It is recommended that ASO designers provide this kind of supporting service definition for their ASO and define the mapping to a specific supporting service definition separately (rather than specifying a mapping to an existing service definition). This approach emphasizes that the ASO can be used with any supporting service that provides an equivalent service. This facilitates the re-use of the ASO and makes it easier for subsequent designers to utilize this ASO with alternate supporting services. Of course, if the designer's intent is that the ASO can only be supported by a specific supporting service, then it should reference that service definition.

Similarly, the responding ACPM will form a User summary parameter on the P-CONNECT response from the AARE APDU, including the semantic content of the User summary parameter of the A-ASSOCIATE response (if present) by reference to the same Upper-Layer Context specification. The initiating ACPM reconstructs the AARE.

NOTE – The passing of the User summary parameters and reconstruction of the ACSE APDUs from the Presentation User summary parameters is abstract. There is no requirement for a real implementation to perform these actions.

7 Elements of procedure

The ACSE protocol consists of the following procedures:

- a) association establishment;
- b) normal release of an association;
- c) abnormal release of an association;
- d) A-DATA; and
- e) ALTER CONTEXT.

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 services, the APDUs involved, and the mapping to the IA-service. Clause 8 describes the IA-service definition, which defines the abstract service that ACSE requires of any supporting service. In clause 9, a detailed specification of the ACSE APDUs is given using the notation of ASN.1 (see ITU-T Rec. X.680 | ISO/IEC 8824-1). Annex A presents the state table for the ACPM. Annex B specifies a simple password authentication-mechanism. Annex C provides the specific mapping of the IA-service to the Presentation service. Annex D provides the specific mapping of the IA-service to the ACSE Service. Annex E provides guidance on the use of the Higher Level Association functional units.

7.1 Association establishment

7.1.1 Purpose

The association establishment procedure is used to establish an association among ASOs. 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. The fields of the AARQ APDU are listed in Table 3. The fields of the AARE APDU are listed in Table 4.

7.1.3 Association establishment procedure

This procedure is driven by the following events:

- a) invocation of an A-ASSOCIATE request primitive from the requestor;
- b) receipt of an AARQ APDU;
- c) receipt of a User summary parameter on a P-CONNECT indication primitive;
- d) invocation of an A-ASSOCIATE response primitive from the acceptor; and
- e) receipt of an AARE APDU or a User summary parameter.

7.1.3.1 A-ASSOCIATE request primitive

The requesting ACPM forms an AARQ APDU from parameter values of the A-ASSOCIATE request primitive and the protocol version and optionally implementation information. The AARQ PDU is mapped to the User-information parameter of the IA-BIND-REQUEST.submit primitive. The ACPM transitions to the Awaiting AARE (STA1) state.

If the fast-associate mechanism is supported, the requesting ACPM identifies the semantic content of the AARQ, including the User data, in the User summary parameter of the P-CONNECT request.

7.1.3.2 AARQ APDU

The accepting ACPM receives an AARQ APDU as the User-information parameter of an IA-BIND-REQUEST.deliver primitive or reconstructs an AARQ APDU from the User summary parameter of the P-CONNECT indication primitive.

The ACPM determines if the AARQ APDU is acceptable based on the rules for extensibility (see 7.6). If the AARQ APDU is not acceptable, a protocol error results (see 7.3.3.4). The association establishment procedure is disrupted. An A-ASSOCIATE indication primitive is not issued. An AARE APDU is formed indicating the error. This APDU is mapped to the User-information parameter of an IA-BIND-RESPONSE.submit primitive, which is invoked. The ACPM transitions to the Idle-Unassociated (STA0) state.

Otherwise, the ACPM next inspects the value of the Protocol Version field of the AARQ APDU. If the ACPM does not support a common protocol version, it forms an AARE APDU with the following assigned fields:

- a) Protocol Version field (optional) with the value that indicates the protocol version(s) that it could support (see 7.1.5.1);
- b) ASO-context-name field with the same value as on the AARQ APDU;
- c) Result field with the value "rejected (permanent);" and source – Diagnostic field with the values "ACSE service-provider" and "no common ACSE version."

In this case, the ACPM sends the AARE APDU. The ACPM does not issue an A-ASSOCIATE indication primitive. The AARE is mapped to the User-information parameter of the IA-BIND-RESPONSE.submit primitive and it is invoked. The association is not established and the ACPM is in the Idle-Unassociated (STA0) state.

If the AARQ APDU is acceptable, the ACPM performs the following actions.

If the ACSE requirements field is present, it forms an ACSE requirements field for the AARE APDU that is the intersection of the functional units requested in the AARQ and those that it supports.

If the ASO-context field or Presentation context definition list are present, it forms the proper result parameters for the AARE.

The ACPM then issues an A-ASSOCIATE indication primitive to the acceptor, and transitions to the Awaiting A-ASCrsp (STA2) state.

7.1.3.3 A-ASSOCIATE response primitive

When the accepting ACPM receives the A-ASSOCIATE response primitive, the Result parameter specifies whether the service-user has accepted or rejected the association. The ACPM forms an AARE APDU using the A-ASSOCIATE response primitive parameters and parameters received in the AARQ. The ACPM sets the Result source – Diagnostic field to "ACSE service-user" and the value derived from the Diagnostic parameter of the response primitive. The AARE APDU is mapped to the User-information parameter of an IA-BIND-RESPONSE.submit primitive.

Table 3 – AARQ APDU parameters

Field name	Presence	Source	Sink
Protocol Version	M	ACPM	ACPM
ASO-context-name	U	req	ind
ASO-context-name-list	U	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
ACSE requirements	U	req	ind
Authentication-mechanism Name	U	req	ind

Table 3 (concluded)

Field name	Presence	Source	Sink
Authentication-value	U	req	ind
Implementation Information	O	ACPM	ACPM
User-information	U	req	ind
Called ASOI-tag	U	req	ind
Calling ASOI-tag	U	req	ind
Presentation context definition list	C	req	ind
NOTE 1 – The Authentication-mechanism Name and Authentication-value fields are only present if the ACSE requirements field includes the Authentication functional unit.			
NOTE 2 – The ASO-context-name-List field is only present if the ACSE requirements field includes the ASO-context negotiation functional unit. The value of the ASO-context-name parameter may be different from any of the names in the ASO-context-name-list parameter or it may be equal to one of the names in the list.			

If the fast-associate mechanism is supported, the accepting ACPM identifies the semantic content of the AARE, including the User data, in the User summary parameter of the P-CONNECT response, by reference to the Upper-Layer Context specification identified by the User summary parameter of the received P-CONNECT indication.

If the acceptor accepted the association request, the Result field of the outgoing AARE APDU specifies "accepted". The association is established and the ACPM transitions to the Associated (STA5) state.

If the acceptor rejected the association request, the Result field of the AARE APDU contains the appropriate rejection value. The association is not established and the ACPM issues an IA-UNBIND.request primitive and transitions to the Idle-Unassociated (STA0) state.

7.1.3.4 AARE APDU

The requesting ACPM receives an AARE APDU as the User-information parameter of an IA-BIND-RESPONSE.deliver primitive. The following situations are possible:

- the association has been accepted;
- the accepting ACPM or the acceptor has rejected the association; or
- the supporting service-provider has rejected the request for the underlying service.

Table 4 – AARE APDU Fields

Field name	Presence	Source	Sink
Protocol Version	O	ACPM	ACPM
ASO-context-name	U	rsp	cnf
ASO-context-name-list	U	req	ind
Responding AP-title	U	rsp	cnf
Responding AE-qualifier	U	rsp	cnf
Responding AP-invocation-identifier	U	rsp	cnf
Responding AE-invocation-identifier	U	rsp/ACPM	cnf
Result	O	rsp/ACPM	cnf
Result source – Diagnostic	O	rsp	cnf
ACSE Requirements	U	req	ind
Authentication-mechanism Name	U	req	ind
Authentication-value	U	req	ind

Table 4 (concluded)

Field name	Presence	Source	Sink
Implementation Information	O	ACPM	ACPM
User-information	U	rsp	cnf
Responding ASOI-tag	U	req	ind
Presentation context result identifier	C	rsp	cnf

NOTE 1 – The authentication-mechanism and authentication-value fields are only present if the ACSE requirements field includes the Authentication functional unit.

NOTE 2 – The ASO-context-name-list field is only present if the ACSE requirements field includes the ASO-context negotiation functional unit and the result = rejected. The value of the ASO-context-name parameter may be different from any of the names in the ASO-context-name-list parameter or it may be equal to one of the names in the list.

NOTE 3 – This ASO-context field is optional. If backward compatibility with older implementations of ACSE is desired, it must be present.

If the association was accepted, the Result field of the AARE APDU specifies "accepted". If it exists, the User summary parameter is a value from which the requesting ACPM can reconstruct the AARE APDU. The requesting ACPM issues an A-ASSOCIATE confirm primitive to the requestor derived from parameters from the supporting service and the AARE APDU. The A-ASSOCIATE confirm primitive Result parameter specifies "accepted". The association is established and the ACPM transitions to the Associated (STA5) state.

If the association was rejected by either the accepting ACPM or by the acceptor, the AARE APDU result parameter specifies "user-rejection". The requesting ACPM issues an A-ASSOCIATE confirm primitive to the requestor derived from parameters from the supporting service and the AARE APDU. The A-ASSOCIATE confirm primitive Result parameter indicates "rejected (transient)" or "rejected (permanent)". The Result source parameter indicates "ACSE service-user" or "ACSE service-provider". The association is not established, and the ACPM issues an IA-UNBIND-REQUEST.submit primitive and transitions to the Idle-Unassociated (STA0) state.

If the request was rejected by the supporting service-provider, the underlying confirm primitive Result parameter specifies "provider-rejection". The requesting ACPM issues an A-ASSOCIATE confirm primitive with the Result parameter indicating "rejected (permanent)". The Result source parameter indicates "supporting service-provider". The association is not established, and the ACPM issues an IA-UNBIND request primitive and transitions to the Idle-Unassociated (STA0) state.

7.1.4 Use of the AARQ APDU fields

The AARQ APDU fields are used by the requesting and accepting ACPMs as specified below.

7.1.4.1 Protocol Version

For the requesting ACPM: the value assigned to this field is determined within the implementation of the ACPM. It is a bit string where each bit that is set to one indicates the version of ACSE protocol that this ACPM supports. Bit 0 represents version 1; bit 1 represents version 2, etc. Multiple bits may be set indicating support of multiple versions. No trailing bits higher than the highest version of this Recommendation | International Standard that the requesting ACPM supports are included. That is, the last bit of the string is set to one.

For the accepting ACPM: the ACPM ignores trailing bits of this field that are higher than the one indicating the latest version of this Recommendation | International Standard that it supports.

7.1.4.2 ASO-context-name

For the requesting ACPM: this value is determined by the value of the ASO-context-name parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the ASO-context-name parameter of the A-ASSOCIATE indication primitive, if issued.

NOTE – This field is optional. If backward compatibility with older implementations of ACSE is desired, it must be present.

7.1.4.3 ASO-context-name-list

For the requesting ACPM: the values assigned to this field are determined by the values of the ASO-context-name-list parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: the values are used to determine the values of the ASO-context-name-list parameter on the A-ASSOCIATE indication primitive, if issued.

7.1.4.4 Calling AP-title

For the requesting ACPM: this value is determined by the value of the Calling AP-title parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the Calling AP-title parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.5 Calling AE-qualifier**7.1.4.5.1 For the requesting ACPM**

If the A-ASSOCIATE request is not for a nested association, but the Calling ASOI-tag parameter of the A-ASSOCIATE request contains precisely one (ASO-qualifier, ASOI-identifier) element, the value of the Calling AE-qualifier field is determined by the value of the ASOI-identifier in that element. Otherwise the field shall be absent.

If the A-ASSOCIATE request is for a nested association (i.e. the A-ASSOCIATE request was issued in the context of an established, nesting association), the value of the Calling AE-qualifier shall be determined by the value of the ASOI-identifier in the last element of the Calling ASOI-tag parameter of the A-ASSOCIATE request.

NOTE – The other elements of the ASOI-tag will be implicit in the nesting association.

7.1.4.5.2 For the accepting ACPM

If the AARQ is not for a nested association, the value of the Calling AE-qualifier field shall determine the value of the ASOI-identifier in the first and only element of the Calling ASOI-tag parameter of the A-ASSOCIATE indication.

If the received AARQ is for a nested association (i.e. it is received in the context of an established association), the accepting ACPM shall create a value for the Calling ASOI-tag parameter of the A-ASSOCIATE indication from the value of the ASOI-tag for the peer side as sent or received during the establishment of the nesting association, with one additional (ASO-qualifier, ASOI-identifier) element. The value of the Calling AE-qualifier field of the received AARQ shall determine the value of the ASOI-identifier in the new, last element of the Calling ASOI-tag parameter of the A-ASSOCIATE indication.

If the nesting and nested associations are established in same directions, the ASOI-tag for the peer side is the Calling ASOI-tag on the A-ASSOCIATE request that established the nesting association. If the nesting and nested associations are established from the same direction, the ASOI-tag for the peer side will be the Responding ASOI-tag (if present) on the A-ASSOCIATE confirm that established the nesting association, or the Called ASOI-tag on the A-ASSOCIATE indication that established the nesting association, if the Responding ASOI-tag was not present on the A-ASSOCIATE confirm.

7.1.4.6 Calling AP-invocation-identifier

For the requesting ACPM: this value is determined by the value of the Calling AP-invocation-identifier parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to derive the value of the Calling AP-invocation-identifier parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.7 Calling AE-invocation-identifier

For the requesting ACPM: this value is determined by the value of the Calling AE-invocation-identifier parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to derive the value of the Calling AE-invocation-identifier parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.8 Called AP-title

For the requesting ACPM: this value is determined by the value of the Called AP-title parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the Called AP-title parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.9 Called AE-qualifier

7.1.4.9.1 For the requesting ACPM

If the A-ASSOCIATE request is not for a nested association, but the Called ASOI-tag parameter of the A-ASSOCIATE request contains precisely one (ASO-qualifier, ASOI-identifier) element, the value of the Called AE-qualifier field is determined by the value of the ASO-qualifier in that element. Otherwise the field shall be absent.

If the A-ASSOCIATE request is for a nested association (i.e. the A-ASSOCIATE request was issued in the context of an established, nesting association), the value of the Called AE-qualifier shall be determined by the value of the ASO-qualifier in the last element of the Called ASOI-tag parameter of the A-ASSOCIATE request.

NOTE – The other elements of the ASOI-tag will be implicit in the nesting association.

7.1.4.9.2 For the accepting ACPM

If the AARQ is not for a nested association, the value of the Called AE-qualifier field shall determine the value of the ASO-qualifier in the first and only element of the Called ASOI-tag parameter of the A-ASSOCIATE indication.

If the received AARQ is for a nested association (i.e. it is received in the context of an established association), the accepting ACPM shall create a value for the Called ASOI-tag parameter of the A-ASSOCIATE indication from the value of the ASOI-tag for this side as sent or received during the establishment of the nesting association, with one additional (ASO-qualifier, ASOI-identifier) element. The value of the Called AE-qualifier field of the received AARQ shall determine the value of the ASO-qualifier in the new, last element of the Called ASOI-tag parameter of the A-ASSOCIATE indication.

If the nesting and nested associations are established from the same direction, the ASOI-tag for this side will be the Responding ASOI-tag (if present) on the A-ASSOCIATE confirm that established the nesting association, or the Called ASOI-tag on the A-ASSOCIATE indication that established the nesting association, if the Responding ASOI-tag was not present on the A-ASSOCIATE confirm. If the nesting and nested associations are established in different directions, the ASOI-tag for this side is the Calling ASOI-tag on the A-ASSOCIATE request that established the nesting association.

7.1.4.10 Called AP-invocation-identifier

For the requesting ACPM: this value is determined by the value of the Called AP-invocation-identifier parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to derive the value of the Called AP-invocation-identifier parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.11 Called AE-invocation-identifier

7.1.4.11.1 For the requesting ACPM

If the A-ASSOCIATE request is not for a nested association, but the Called ASOI-tag parameter of the A-ASSOCIATE request contains precisely one (ASO-qualifier, ASOI-identifier) element, the value of the Called AE-qualifier field is determined by the value of the ASOI-identifier in that element. Otherwise the field shall be absent.

If the A-ASSOCIATE request is for a nested association (i.e. the A-ASSOCIATE request was issued in the context of an established, nesting association), the value of the Called AE-qualifier shall be determined by the value of the ASOI-identifier in the last element of the Called ASOI-tag parameter of the A-ASSOCIATE request.

NOTE – The other elements of the ASOI-tag will be implicit in the nesting association.

7.1.4.11.2 For the accepting ACPM

If the AARQ is not for a nested association, the value of the Called AE-qualifier field shall determine the value of the ASOI-identifier in the first and only element of the Called ASOI-tag parameter of the A-ASSOCIATE indication.

If the received AARQ is for a nested association (i.e. it is received in the context of an established association), the accepting ACPM shall create a value for the Called ASOI-tag parameter of the A-ASSOCIATE indication from the value of the ASOI-tag for this side as sent or received during the establishment of the nesting association, with one additional (ASO-qualifier, ASOI-identifier) element. The value of the Called AE-qualifier field of the received AARQ

shall determine the value of the ASOI-identifier in the new, last element of the Called ASOI-tag parameter of the A-ASSOCIATE indication.

If the nesting and nested associations are established from the same direction, the ASOI-tag for this side will be the Responding ASOI-tag (if present) on the A-ASSOCIATE confirm that established the nesting association, or the Called ASOI-tag on the A-ASSOCIATE indication that established the nesting association, if the Responding ASOI-tag was not present on the A-ASSOCIATE confirm. If the nesting and nested associations are established in different directions, the ASOI-tag for this side is the Calling ASOI-tag on the A-ASSOCIATE request that established the nesting association.

7.1.4.12 ACSE requirements

For the requesting ACPM: the value assigned to this field is determined by the value of the ACSE requirements parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the ACSE requirements parameter of the A-ASSOCIATE indication primitive, if issued. The ACPM inspects the ACSE requirements field and removes any functional units not supported by the ACPM before issuing it to the service-user.

7.1.4.13 Authentication-mechanism Name

For the requesting ACPM: the value assigned to this field is determined by the value of the Authentication-mechanism Name parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the Authentication-mechanism Name parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.14 Authentication-value

For the requesting ACPM: the value assigned to this field is determined by the value of the Authentication-value parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the Authentication-value parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.15 Implementation Information

For the requesting ACPM: the value assigned to this field is determined within the implementation of the ACPM. It contains information specific to the individual implementation of that ACPM. It is not used in negotiation.

For the accepting ACPM: this field does not affect the operation of the ACPM. Any use depends on a common understanding between the requesting and accepting ACPMs.

7.1.4.16 User-information

For the requesting ACPM: this value is determined by the value of the User-information parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: this value is used to determine the value of the User-information parameter of the A-ASSOCIATE indication primitive, if issued.

7.1.4.17 Called ASOI-tag

For the accepting ACPM: if the higher-level functional unit is proposed in the ACSE requirements parameter, the value assigned to this field shall be determined by the value of the Called ASOI-tag parameter of the A-ASSOCIATE request.

For the receiving ACPM: the value of this field shall determine the value of the Called ASOI-tag parameter of the A-ASSOCIATE indication.

7.1.4.18 Calling ASOI-tag

For the accepting ACPM: if the higher-level functional unit is proposed in the ACSE requirements parameter, the value assigned to this field shall be determined by the value of the Calling ASOI-tag parameter of the A-ASSOCIATE request.

For the receiving ACPM: the value of this field shall determine the value of the Calling ASOI-tag parameter of the A-ASSOCIATE indication.

7.1.4.19 Presentation context definition list

This parameter is defined in ITU-T Rec. X.226 | ISO/IEC 8823-1.

7.1.5 Use of the AARE APDU fields

The AARE APDU fields are used by the accepting and requesting ACPMs as specified below.

7.1.5.1 Protocol Version

For the accepting ACPM: the value of this field assigned by the ACPM depends on whether the association request is accepted or rejected by the ACPM and the acceptor, as specified below:

- a) If the association is accepted, the value assigned by the ACPM is a variable length bit string that indicates the protocol version selected by the ACPM from those proposed in the AARQ APDU. Only the bit indicating the version selected is set to one.
- b) If the association is rejected, the value assigned by the ACPM is a variable length bit string that indicates the protocol version(s) of this Recommendation | International Standard that could be supported by the ACPM.

For the requesting ACPM: the use of the value in this field depends on whether the association request is accepted or rejected.

- a) If the association is accepted, this value defines the protocol version of this Recommendation | International Standard to be used for this association.
- b) If the association is rejected, the use of this value is a local option.

7.1.5.2 ASO-context-name

For the accepting ACPM: this value is determined by the value of the ASO-context-name parameter of the A-ASSOCIATE response primitive.

For the requesting ACPM: this value is used to determine the value of the ASO-context-name parameter of the A-ASSOCIATE confirm primitive.

NOTE – This field is optional. If backward compatibility with older implementations of ACSE is desired, it must be present.

7.1.5.3 ASO-context-name-list

For the accepting ACPM: the values assigned to this field are determined by the values of the ASO-context-name-list parameter on the A-ASSOCIATE response primitive.

For the requesting ACPM: the values are used to determine the values of the ASO-context-name-list parameter on the A-ASSOCIATE confirm primitive.

7.1.5.4 Responding AP-title

For the accepting ACPM: this value is determined by the value of the Responding AP-title parameter of the A-ASSOCIATE response primitive.

For the requesting ACPM: this value is used to determine the value of the Responding AP-title parameter of the A-ASSOCIATE confirm primitive, if issued.

7.1.5.5 Responding AE-qualifier

For the accepting ACPM: if the higher-level functional unit is proposed in the ACSE requirements parameter, the value assigned to this field shall be determined by the value of the Responding AE-qualifier parameter of the A-ASSOCIATE request.

For the receiving ACPM: the value of this field shall determine the value of the Responding AE-qualifier parameter of the A-ASSOCIATE indication.

7.1.5.6 Responding AP-invocation-identifier

For the accepting ACPM: if the higher-level functional unit is proposed in the ACSE requirements parameter, the value assigned to this field shall be determined by the value of the Responding AP-invocation-identifier parameter of the A-ASSOCIATE request.

For the receiving ACPM: the value of this field shall determine the value of the Responding AP-invocation-identifier parameter of the A-ASSOCIATE indication.

7.1.5.7 Responding AE-invocation-identifier

For the accepting ACPM: if the higher-level functional unit is proposed in the ACSE requirements parameter, the value assigned to this field shall be determined by the value of the Responding AE-invocation-identifier parameter of the A-ASSOCIATE request.

For the receiving ACPM: the value of this field shall determine the value of the Responding AE-invocation-identifier parameter of the A-ASSOCIATE indication.

7.1.5.8 Result

For the accepting ACPM: the value is determined by the ACPM or by the acceptor as specified below:

- a) if the AARQ APDU is rejected by the ACPM (i.e. an A-ASSOCIATE indication primitive is not issued to the acceptor), the value of "rejected (permanent)" or "rejected (transient)" is assigned by the ACPM;
- b) otherwise, the value is determined by the Result parameter of the A-ASSOCIATE response primitive.

For the requesting ACPM: this value is used to determine the value of the Result parameter of the A-ASSOCIATE confirm primitive.

NOTE – This field is optional. If backward compatibility with older implementations of ACSE is desired, it must be present.

7.1.5.9 Result source – Diagnostic

This field contains both the Result source value and the Diagnostic value.

NOTE – This field is optional. If backward compatibility with older implementations of ACSE is desired, it must be present.

7.1.5.9.1 Result source value

For the accepting ACPM: this value is assigned by the ACPM as specified below:

- a) if the AARQ APDU is rejected by the ACPM (i.e. an A-ASSOCIATE indication primitive is not issued to the acceptor), it assigns the value "ACSE service-provider";
- b) otherwise, the ACPM assigns the value "ACSE service-user".

For the requesting ACPM: this value is used to determine the value of the Result source parameter of the A-ASSOCIATE confirm primitive.

7.1.5.9.2 Diagnostic value

For the accepting ACPM: this value is determined by the ACPM or by the acceptor as specified below:

- a) If the AARQ APDU is rejected by the ACPM (i.e. an A-ASSOCIATE indication primitive is not issued to the acceptor), the appropriate value is assigned by the ACPM.
- b) Otherwise, the value is determined by the value of the Diagnostic parameter of the A-ASSOCIATE response primitive. If the Diagnostic parameter is not included on the response primitive, the ACPM assigns the value of "null".

For the requesting ACPM: this value is used to determine the value of the Diagnostic parameter of the A-ASSOCIATE confirm primitive, unless it has the value of "null". In this case, a Diagnostic value is not included.

7.1.5.10 ACSE requirements

For the accepting ACPM: the value assigned to this field is determined by the value of the ACSE requirements parameter of the A-ASSOCIATE response primitive. This value shall only include functional units that were on the indication primitive.

For the requesting ACPM: this value is used to determine the value of the ACSE requirements parameter of the A-ASSOCIATE confirm primitive.

7.1.5.11 Authentication-mechanism Name

For the accepting ACPM: the value assigned to this field is determined by the value of the Authentication-mechanism Name parameter of the A-ASSOCIATE response primitive.

For the requesting ACPM: this value is used to determine the value of the Authentication-mechanism Name parameter of the A-ASSOCIATE confirm primitive.

7.1.5.12 Authentication-value

For the accepting ACPM: the value assigned to this field is determined by the value of the Authentication-value parameter of the A-ASSOCIATE response primitive.

For the requesting ACPM: this value is used to determine the value of the Authentication-value parameter of the A-ASSOCIATE confirm primitive.

7.1.5.13 Implementation Information

For the accepting ACPM: the value assigned to this field is determined within the implementation of the ACPM. It contains information specific to the individual implementation of that ACPM. It is not used in negotiation.

For the requesting ACPM: this field does not affect the operation of the ACPM. Any use depends on a common understanding between the accepting and requesting ACPMs.

7.1.5.14 User-information

For the accepting ACPM: this value is determined by the value of the User-information parameter of the A-ASSOCIATE response primitive.

For the requesting ACPM: this value is used to determine the value of the User-information parameter of the A-ASSOCIATE confirm primitive.

7.1.5.15 Responding ASOI-tag

For the accepting ACPM: if the higher-level functional unit is proposed in the ACSE requirements parameter, the value assigned to this field shall be determined by the value of the Responding ASOI-tag parameter of the A-ASSOCIATE request.

For the receiving ACPM: the value of this field shall determine the value of the Responding ASOI-tag parameter of the A-ASSOCIATE indication.

7.1.5.16 Presentation context result identifier

This parameter is defined in ITU-T Rec. X.226 | ISO/IEC 8823-1.

7.1.6 Collisions and interactions

7.1.6.1 A-ASSOCIATE service

For an outermost ACPM, an A-ASSOCIATE collision cannot occur (see 6.4). In this case, the two distinct ACPMs would be involved that represent the processing for two distinct associations:

- a) an ACPM that processes the initial A-ASSOCIATE request primitive that results in the sending of an AARQ; and
- b) an ACPM that processes the subsequently received AARQ APDU.

For ACPMs that are used to establish higher level associations, events can occur when the ACPM is in the Awaiting AARE (STA1) state. There are two distinct cases that must be considered:

- 1) The ASOI-tags are present, but the Called ASOI-tag of the received AARQ is not the same as the calling ASOI-tag of the AARQ sent (and vice versa). In this case, two associations would be formed and ASOIs would be created if necessary. (If one AARQ has ASO-name and no ASOI-tag and the other has an ASO-name and ASOI-tag, then two distinct associations are created.)
- 2) The ASOI-tags are present, and the Called ASOI-tag of the received AARQ is identical to the calling ASOI-tag of the AARQ sent (and vice versa). In this case, the action is determined by the control function. To effect this, the A-ASSOCIATE indication primitives are invoked and the CF (potentially after interaction with other ASEs/ASOs and the User) determines the appropriate action.

NOTE – Since the Directory is not intended to maintain ASOI-tag information, such use must be supported by the application.

7.1.6.2 A-ABORT service

If an ACPM receives an A-ABORT request primitive or an IA-ABORT.deliver primitive, it discontinues the normal association establishment procedure, and instead follows the abnormal release procedure.

7.2 Normal release of an association

7.2.1 Purpose

This procedure is used for the normal release of an association by an ASO. It supports the A-RELEASE service.

7.2.2 APDUs used

The normal release procedure uses the A-RELEASE-REQUEST (RLRQ) APDU and the A-RELEASE-RESPONSE (RLRE) APDU. The fields of the RLRQ APDU are listed in Table 5. The fields of the RLRE APDU are listed in Table 6.

Table 5 – RLRQ APDU fields

Field name	Presence	Source	Sink
Reason	U	req	ind
ASO-qualifier	C	req	ind
ASOI-identifier	C	req	ind
User-information	U	req	ind

Table 6 – RLRE APDU fields

Field name	Presence	Source	Sink
Reason	U	rsp	cnf
ASO-qualifier	C	req	ind
ASOI-identifier	C	req	ind
User-information	U	rsp	cnf

7.2.3 Normal release procedure

This procedure is driven by the following events:

- a) an A-RELEASE request primitive from the requestor;
- b) an RLRQ APDU;
- c) an A-RELEASE response primitive from the acceptor; or
- d) an RLRE APDU.

7.2.3.1 A-RELEASE request primitive

When an A-RELEASE request primitive is received, the ACPM generates an RLRQ APDU using the parameters from the A-RELEASE request primitive. The RLRQ is mapped to the User-information field of an IA-RELEASE-REQUEST.submit primitive. The IA-RELEASE-REQUEST.submit is invoked and the ACPM transitions to the Awaiting RLRE (STA3) state.

NOTE – The requestor is required to meet the supporting service requirements in order to issue an A-RELEASE request primitive (see Annex C).

The requesting ACPM now waits for a primitive from the underlying service-provider. It does not accept any primitives from the service user other than an A-ABORT request primitive.

7.2.3.2 RLRQ APDU

When the accepting ACPM receives the RLRQ APDU as the contents of the User-information parameter of an IA-DATA.deliver or an IA-RELEASE-REQUEST.deliver, it issues an A-RELEASE indication primitive to the acceptor. It does not accept any ACSE primitives from its service-user other than an A-RELEASE response primitive or an A-ABORT request primitive. The ACPM transitions to the Awaiting A-RLSrsp (STA4) state.

7.2.3.3 A-RELEASE response primitive

The Result parameter on the A-RELEASE response primitive specifies whether the acceptor accepts or rejects the release of the association. The accepting ACPM forms an RLRE APDU from the response primitive parameters.

If the acceptor accepted the release, the Result parameter of the A-RELEASE response primitive has a Result parameter value of "affirmative". The RLRE is mapped to the User-information field of an IA-RELEASE-RESPONSE.submit primitive. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists, and the ACPM transitions to the Idle-Unassociated (STA0) state.

If the acceptor rejected the release, the Result parameter of the A-RELEASE response primitive has a Result parameter value of "negative". The RLRE is mapped to the User-information field of an IA-RELEASE-REFUSE.submit primitive and the primitive is invoked. The association continues; the ACPM transitions to the Associated (STA5) state.

NOTE – To give a negative response, the acceptor is required to meet the related underlying service requirements (see Annex C).

7.2.3.4 RLRE APDU

The requesting ACPM receives an RLRE APDU as the contents of the User data parameter of an IA-DATA.deliver or an IA-RELEASE-RESPONSE.deliver from its peer. The Reason field specifies either that the acceptor agrees or disagrees that the association may be released. The requesting ACPM forms an A-RELEASE confirm primitive from the RLRE APDU fields:

- a) If the Result parameter on the RLRE APDU specifies "affirmative", the association is released. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists, and the ACPM transitions to the Idle-Unassociated (STA0) state.
- b) If the Result parameter on the RLRE APDU specifies "negative", the association continues. The requesting ACPM again accepts primitives from its service-user, and the ACPM transitions to the Associated (STA5) state. It invokes an IA-RELEASE-REFUSE primitive.

7.2.3.5 A-RELEASE service collision

An A-RELEASE service collision occurs when an ACPM has sent out an RLRQ APDU (as a result of receiving an A-RELEASE request primitive from its service-user). Instead of receiving the expected RLRE APDU from its peer, it receives an RLRQ APDU.

The ACPM issues an A-RELEASE indication primitive to its service-user. The procedure then followed by an ACPM depends on whether its service-user was the association-initiator or the association-responder:

- a) *For the association-initiator:*
 - 1) The ACPM waits for an A-RELEASE response primitive from its service-user. The ACPM transitions to the Collision-Association initiator (STA6) state.
 - 2) When it receives the response primitive, it forms an RLRE APDU from the response primitive's parameters. The RLRE is mapped to an IA-RELEASE-RESPONSE.submit which is invoked and the association continues. The ACPM transitions to the Awaiting RLRE (STA3) state.
 - 3) This ACPM now waits for an RLRE from its peer. It does not accept any primitive from its service-user other than an A-ABORT request primitive.
 - 4) When the ACPM receives an RLRE, it forms an A-RELEASE confirm primitive from the RLRE fields and issues it to its service-user. The association is released. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists. The ACPM transitions to the Idle-Unassociated (STA0) state.

In summary, the sequence of events that drive the ACPM of the association-initiator is:

- A-RELEASE request primitive;
- RLRQ APDU (causing the collision);
- A-RELEASE response primitive; and finally,
- RLRE APDU.

- b) *For the association-responder:*
 - 1) The ACPM waits for an RLRE from its peer. It does not accept a primitive from its service-user other than an A-RELEASE response or an A-ABORT request primitive. The ACPM transitions to the Collision Association responder (STA7) state.
 - 2) When this ACPM receives an RLRE, it forms an A-RELEASE confirm primitive from the RLRE fields. The association continues and the ACPM transitions to the Awaiting A-RLSrsp (STA4) state.

- 3) If the ACPM has already received the A-RELEASE response primitive, it forms a RLRE APDU from the response primitive's parameters and maps the RLRE to an IA-RELEASE-RESPONSE.submit to send the APDU. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists, and the ACPM transitions to the Idle-Unassociated (STA0) state. Otherwise, the ACPM now waits for an A-RELEASE response primitive from its service-user. When it receives the response primitive, it forms a RLRE APDU from the response primitive's parameters, which is mapped to an IA-RELEASE-RESPONSE.submit primitive which is invoked. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists. The ACPM transitions to the Idle-Unassociated (STA0) state.

In summary, the sequence of events that drive the ACPM of the association-responder for the release of a presentation-connection is:

- A-RELEASE request primitive;
- RLRQ APDU (causing the collision);
- RLRE APDU; and
- A-RELEASE response primitive.

7.2.4 Use of the RLRQ APDU fields

The RLRQ APDU fields are used by the requesting and accepting ACPMs as specified below.

7.2.4.1 Reason

For the requesting ACPM: this value is determined by the value of the Reason parameter of the A-RELEASE request primitive.

For the accepting ACPM: this value is used to determine the value of the Reason parameter of the A-RELEASE indication primitive.

7.2.4.2 User-information

For the requesting ACPM: this value is determined by the value of the User-information parameter of the A-RELEASE request primitive.

For the accepting ACPM: this value is used to determine the value of the User-information parameter of the A-RELEASE indication primitive.

7.2.4.3 ASO-qualifier

This parameter is used to distinguish APDUs for different child ASOs within the scope of a parent ASO. This parameter can be considered analogous to a protocol-id. The parameter is only required if there are multiple child ASOs within a parent ASO. Its use is therefore conditional.

7.2.4.4 ASOI-identifier

This parameter is used to distinguish APDUs for multiple instances of the same ASO existing concurrently. This parameter is only required if there are multiple instances of a given ASO active at the same time. Its use is therefore conditional.

7.2.5 Use of the RLRE APDU fields

The RLRE APDU fields are used by the accepting and requesting ACPMs as specified below.

7.2.5.1 Reason

For the accepting ACPM: this value is determined by the value of the Reason parameter of the A-RELEASE response primitive.

For the requesting ACPM: this value is used to determine the value of the Reason parameter of the A-RELEASE confirm primitive.

7.2.5.2 User-information

For the accepting ACPM: this value is determined by the value of the User-information parameter of the A-RELEASE response primitive.

For the requesting ACPM: this value is used to determine the value of the User-information parameter of the A-RELEASE confirm primitive.

7.2.5.3 ASO-qualifier

This parameter is used to distinguish APDUs for different child ASOs within the scope of a parent ASO. This parameter can be considered analogous to a protocol-id. The parameter is only required if there are multiple child ASOs within a parent ASO. Its use is therefore conditional.

7.2.6 Collisions and disruptions

7.2.6.1 A-RELEASE service collision

For a given ACPM, an A-RELEASE service collision can occur. The processing for such a collision is described in 7.2.3.5.

NOTE – An A-RELEASE service collision can only occur if no session tokens were selected for the association.

7.2.6.2 A-RELEASE disruption

The normal release procedure is disrupted when the ACPM receives an A-ABORT request primitive, IA-ABORT.deliver primitive. The processing for the ACPM follows the abnormal release procedure (see Annex D).

7.3 Abnormal release of an association

7.3.1 Purpose

The abnormal release procedure can be used at any time to force the abrupt release of the association by a requestor in either ASO, by either ACPM or by the supporting service-provider. When the abnormal release procedure is applied during an attempt to establish an association, the association is not established. The abnormal release procedure supports the A-ABORT and A-P-ABORT services.

7.3.2 APDUs used

The abnormal release procedure uses the A-ABORT (ABRT) APDU. The fields of the ABRT APDU are listed in Table 7.

NOTE – No APDUs are defined for the IA-ABORT.deliver service since it is directly mapped from the underlying Provider ABORT service. This requires any supporting service to be able to make this mapping.

Table 7 – ABRT APDU fields

Field name	Presence	Source	Sink
Abort source	M	ACPM	ind
Diagnostic	U	req	ind
ASO-qualifier	C	req	ind
ASOI-identifier	C	req	ind
User-information	C	req	ind
User data	U	req	ind

7.3.3 Abnormal release procedure

This procedure is driven by any of the following events:

- a) an A-ABORT request primitive from the requestor;
- b) ABRT APDU;
- c) an IA-ABORT.deliver primitive or an IA-UNBIND.deliver; or
- d) a protocol error detected by an ACPM.

7.3.3.1 A-ABORT request primitive

When an ACPM receives an A-ABORT request service primitive, it will formulate an ABRT APDU and map it to the User-information field of the IA-ABORT.submit and deliver the primitive to the supporting service to forward it to its peer ACPM. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists, and the ACPM transitions to the Idle-Unassociated (STA0) state.

7.3.3.2 ABRT APDU

If IA-DATA.deliver or IA-ABORT.deliver primitive contains an ABRT APDU, the ACPM issues an A-ABORT indication primitive using the Abort source field of the ABRT APDU. If a User Information field is contained in the ABRT APDU, it is included on the A-ABORT indication primitive. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists, and the ACPM transitions to the Idle-Unassociated (STA0) state.

7.3.3.3 IA-UNBIND.deliver

The receipt of an IA-UNBIND.deliver informs the ACPM that the support for the association by the supporting service has terminated. The supported association is terminated, since there is no longer an instance of use of the supporting service to provide a context for further service primitives or APDUs.

7.3.3.4 Protocol errors

Two types of ACSE protocol errors are possible:

- a) for a particular ACPM state, an unexpected APDU is received; or
- b) an invalid field is encountered during the processing of an incoming APDU (see 7.6).

If an unexpected APDU is received, the abnormal release procedure is invoked. If an invalid field is detected by an ACSE procedure, that procedure is disrupted and the abnormal release procedure is invoked.

As part of the abnormal release procedure, the ACPM issues an A-ABORT indication primitive to its service-user, unless the error occurred during the association establishment procedure as the result of receiving an invalid AARQ (see 7.6).

NOTE – Since an A-ASSOCIATE indication primitive will not be issued, an A-ABORT indication primitive would have no meaning, and, therefore, it is not issued.

If an indication primitive is issued, the value of the Abort Source is "ACSE service-provider". The User-Information parameter is not used as specified below. The association is released. An IA-UNBIND.submit primitive is invoked to notify the supporting service that the supported association no longer exists, and the ACPM transitions to the Idle-Unassociated state (STA0).

7.3.4 Use of the ABRT APDU fields

The ABRT APDU fields are used by the requesting and accepting ACPMs as specified below.

7.3.4.1 Abort source

For the requesting ACPM: this value is assigned by the ACPM as specified below:

- a) if the ACPM initiated the abort procedure, the ACPM assigns the value of "ACSE service-provider";
- b) otherwise, the ACPM assigns the value of "ACSE service-user".

For the accepting ACPM: this value is used to determine the value of the Abort source parameter of the A-ABORT indication primitive.

7.3.4.2 Diagnostic

For the requesting ACPM: if initiated by the service user, this value is determined by the value of the Diagnostic parameter of the A-ABORT request primitive. If generated by the ACPM, the ACPM determines the value.

For the accepting ACPM: this value is used to determine the value of the Diagnostic parameter of the A-ABORT indication primitive.

7.3.4.3 ASO-qualifier

This parameter is used to distinguish APDUs for different child ASOs within the scope of a parent ASO. This parameter can be considered analogous to a protocol-id. The parameter is only required if there are multiple child ASOs within a parent ASO. Its use is therefore conditional.

7.3.4.4 ASOI-identifier

This parameter is used to distinguish APDUs for multiple instances of the same ASO existing concurrently. This parameter is only required if there are multiple instances of a given ASO active at the same time. Its use is therefore conditional.

7.3.4.5 User-information

For the requesting ACPM: this value is determined by the value of the User-information parameter of the A-ABORT request primitive.

For the accepting ACPM: this value is used to determine the value of the User-information parameter of the A-ABORT indication primitive.

7.3.5 Collisions and interactions

The abnormal release procedure may be used whenever an association is established, is in the process of being established, or is being normally released. This procedure disrupts any other currently active procedure. An IA-ABORT.deliver primitive can disrupt the A-ABORT procedure with loss of the A-ABORT information. Collisions of ABRT APDUs are governed by the IA-ABORT services.

7.4 A-DATA

7.4.1 Purpose

The purpose of the A-DATA procedure is to provide the mechanism by which data is transferred on an ASO-association transparently.

7.4.2 APDUs used

The A-DATA procedure uses the A-DT APDU. The fields are listed in Table 8.

Table 8 – A-DT parameters

Parameter name	Presence	Source	Sink
ASO-qualifier	C	req	ind
ASOI-identifier	C	req	ind
A-User-data	M	submit	deliver

7.4.3 A-DATA procedure

This procedure is driven by the following events:

- a) an A-DATA.submit primitive; and
- b) an A-DT APDU.

7.4.3.1 A-DATA.submit primitive

When the ASOI wishes to send data on an existing ASO-association, it formulates and sends an A-DT APDU by invoking an IA-DATA.submit primitive. The A-DT APDU is sent to the peer ASOI on the existing ASO-association.

7.4.3.2 A-DT APDU

The accepting ACPM receives the A-DT APDU from its peer. The ACPM uses the ASO-qualifier to determine to which child ASO the APDU is to be delivered and the ASO-association-identifier to determine which ASO-association within that child ASO the APDU belongs. If there is only one ASO, the ASO-identifier may not be present (or necessary). If there is only one ASO-association active in this child ASO, the ASO-association-identifier may not be present (or necessary). The accepting ACPM delivers the A-User-data by invoking an A-DATA.deliver service primitive.

7.4.4 Use of the A-DT APDU fields

7.4.4.1 ASO-qualifier

This parameter is used to distinguish APDUs for different child ASOs within the scope of a parent ASO. This parameter can be considered analogous to a protocol-id. The parameter is only required if there are multiple child ASOs within a parent ASO. Its use is therefore conditional.

7.4.4.2 ASOI-identifier

This parameter is used to distinguish APDUs for multiple instances of the same ASO existing concurrently. This parameter is only required if there are multiple instances of a given ASO active at the same time. Its use is therefore conditional.

7.4.4.3 A-User-data

The A-User-data parameter is mandatory. This parameter has meaning only to the ASO on which the ASO-association terminates.

7.5 A-ALTER-CONTEXT

7.5.1 Purpose

The A-ALTER-CONTEXT procedure is used to modify either the ASO-context, the presentation context or both on an established ASO-association. The use of this facility is optional. The use of the facility is specified in the ASO-context definition. The A-ALTER-CONTEXT is used during the lifetime of the association, therefore, it is not used to change protocols, i.e. whole CFs, but to modify the use of the protocol on the association.

7.5.2 APDUs used

The A-ALTER-CONTEXT procedure uses the ACRQ and ACRP APDUs. The fields of these PDUs are listed below.

7.5.3 A-ALTER-CONTEXT procedure

7.5.4 A-ALTER-CONTEXT-REQUEST procedure

When the A-ALTER-CONTEXT request primitive is invoked, the ACPM will formulate an ACRQ APDU and send it on the appropriate ASO-association by invoking an IA-DATA.submit primitive. The User-information field is assumed to be interpreted by the receiving ASO as being in the new contexts specified by this APDU. The A-ALTER-CONTEXT only affects the contexts of the ASO-association. It never has an effect on the Defined Context List maintained by the Presentation Layer, or any other supporting service.

NOTE – The existence or non-existence of A-User-information can be used to create a synchronized or unsynchronized context change (analogous to using major or minor synchronize). ASOs making use of this property must explicitly specify when the User-information field can and cannot be used.

7.5.4.1 ACRQ APDU

When the accepting ACPM receives an ACRQ APDU, it attempts to modify the ASO and presentation contexts according to the fields in the request. Any User-information is interpreted in terms of this new context. An ACPM can only have one outstanding ACRQ APDU at a time. Based on the acceptance or rejection of the proposed context changes, the ACPM formulates an ACRP APDU and sends it to the peer ACPM by invoking an IA-DATA.submit primitive. If the new context changes are not acceptable, the accepting ACPM discards the contents of the User-information field.

7.5.4.2 ACRP procedure

When the ACPM receives an ACRP APDU on an IA-DATA.deliver, it determines whether or not the context changes were accepted and invokes a A-ALTER-CONTEXT confirm primitive to the ACSE user. If the context changes were refused, the ACPM maintains the contexts that were in place before the ACRQ APDU was sent. If the context changes were accepted, the new context is assumed to be in place.

7.5.5 Use of the ACRQ fields

See Table 9.

Table 9 – ACRQ parameters

Parameter name	Presence	Source	Sink
ASO-qualifier	C	req	ind
ASOI-identifier	C	req	ind
ASO-context-name	U	req	ind
ASO-context-name-list	U	req	ind
Presentation context definition list	U	req	ind
User-information	U	req	ind

7.5.5.1 ASO-qualifier

This parameter is used to distinguish APDUs for different child ASOs within the scope of a parent ASO. This parameter can be considered analogous to a protocol-id. The parameter is only required if there are multiple child ASOs within a parent ASO. Its use is therefore conditional.

7.5.5.2 ASOI-identifier

This parameter is used to distinguish APDUs for multiple instances of the same ASO existing concurrently. This parameter is only required if there are multiple instances of a given ASO active at the same time. Its use is therefore conditional.

7.5.5.3 ASO-context-name

This parameter identifies the ASO-context proposed by the requestor. The acceptor returns either the same or refuses the context. The returned name specifies the ASO-context to be used for this association.

7.5.5.4 ASO-context-name-list

For the requesting ACPM: the values assigned to this field are determined by the values of the ASO-context-name-list parameter of the A-ASSOCIATE request primitive.

For the accepting ACPM: the values are used to determine the values of the ASO-context-name-list parameter on the A-ASSOCIATE indication primitive, if issued.

7.5.5.5 Presentation context definition list

{see ITU-T Rec. X.226 | ISO/IEC 8823-1}

7.5.5.6 User-information

The User-information parameter is optional. This parameter has meaning only to the ASO on which the ASO-association terminates. The User-information in this primitive will be considered to be interpreted in terms of whatever context changes were specified by this service. It should be noted that not using this parameter can be used to create a "synchronized" change of context. An ASO wishing to utilize this feature must specify precisely when this parameter should not be used.

7.5.6 Use of the ACRP fields

7.5.6.1 ASO-qualifier

This parameter is used to distinguish APDUs for different child ASOs within the scope of a parent ASO. This parameter can be considered analogous to a protocol-id. The parameter is only required if there are multiple child ASOs within a parent ASO. Its use is therefore conditional.

Table 10 – ACRP parameters

Parameter name	Presence	Source	Sink
ASO-qualifier	C	req	ind
ASOI-identifier	C	req	ind
ASO-context-name	C	rsp	cnf
Presentation context result list	U	rsp	cnf
User-information	U	rsp	cnf

7.5.6.2 ASOI-identifier

This parameter is used to distinguish APDUs for multiple instances of the same ASO existing concurrently. This parameter is only required if there are multiple instances of a given ASO active at the same time. Its use is therefore conditional.

7.5.6.3 ASO-context-name

This parameter identifies the ASO-context proposed by the acceptor. The acceptor returns either the same or refuses the context. The returned name specifies the ASO-context to be used for this association.

7.5.6.4 Presentation context result list

{see ITU-T Rec. X.226 | ISO/IEC 8823-1}

7.5.6.5 User-information

The User-information parameter is optional. This parameter has meaning only to the ASO on which the ASO-association terminates. The User-information in this primitive will be considered to be interpreted in terms of whatever context changes were specified by this service. It should be noted that this parameter can be used to create a "synchronized" change of context. An ASO wishing to utilize this feature must specify precisely when this parameter should not be used.

7.6 Rules for extensibility

When processing an incoming AARQ, the accepting ACPM shall:

- ignore all tagged values that are not defined in the abstract syntax of this Recommendation | International Standard; and
- ignore all unknown bit name assignments within a bit string.

After the association has been established or during the establishment of an association, only those ACSE APDUs and related APDU fields defined in the ASN.1 description of the negotiated version of this Recommendation | International Standard shall be issued.

A received APDU or field within an APDU which is not defined in the ASN.1 description of the negotiated version of this Recommendation | International Standard shall be treated as a protocol error.

8 Supporting Service Definition assumed by ACSE

This clause defines the service primitives invoked by the ACSE protocol state machine to pass the ACSE APDUs to and to request services from the supporting service. In general, the supporting service for ACSE will be either the Presentation service or, via the CF of an outer ASO, another instance of ACSE. However, any ASE Service Definition that is compatible with this definition and can be used without perturbing the behaviour of the communicating ACSE protocol machines, can be used to provide the supporting service. Annexes C and D define specific mappings to this service definition. Any ASO using a different supporting service should define a similar mapping.

NOTE – The primary purpose of this clause is to provide a service definition to be used by authors of mappings to specific supporting services. Implementors will only need a cursory knowledge of this material, but should pay careful attention to Annexes D and E.

To support the ability for this Recommendation | International Standard to be used for more than one lower layer mapping, the following terminology is used consistently throughout.

ACPM is the term used to designate an ASOI that implements this Recommendation | International Standard.

Supported association is the term used to designate the ASO-association created by the ACPM generating the IA-primitives.

"Instance of the supporting service" is the term used to designate the binding to an endpoint instance that will be the local context of all APDUs sent or received on the supported association. This can be mapped to a Presentation Connection provided by the Presentation protocol (see Annex C) or the mapping can be managed by the CF of an outer ASO, making use of one or more ASO-associations provided by the ACSE protocol (see annex D), or an equivalent service provided by some other protocol.

For the purposes of this specification, it is assumed that the instance of the supporting service can be modeled as having the following states:

- NULL – No instance of the supporting service exists. For the ACSE protocol, Idle-Unassociated (STA0) is an equivalent state.
- ASSOCIATION PENDING – The ASO has requested an instance of the supporting service and is awaiting a response. Once the request for a supporting service is made the service is in the Establishment Phase. For the ACSE protocol initiator and recipient respectively, Awaiting AARE (STA1) or Awaiting A-ASCrsp (STA2) are equivalent states.
- ESTABLISHED – The ASO has received notification that the supporting service instance has been established. The ASO has entered the Data Transfer Phase. For the ACSE protocol, Associated (STA5) is an equivalent state.
- RELEASE PENDING – The ASO or its peer has requested the instance of the supporting service be terminated. The ASO is awaiting a response from its peer. For the ACSE protocol, Awaiting RLRE (STA3) or the Awaiting A-RLSrsp (STA4) is an equivalent state.

A supporting service will either have this state behaviour as a subset of its overall behaviour or it may use the CF to align its behaviour to this service definition.

8.1 IA-BIND

8.1.1 IA-BIND request

8.1.1.1 IA-BIND-REQUEST.submit

This primitive is invoked by an initiating ACPM to request an instance of the supporting service for the ASO-association that it is attempting to create.

8.1.1.1.1 When Invoked

The initiating ACPM will be in the Awaiting AARE (STA1) state. The supporting service may be in any state except RELEASE PENDING.

8.1.1.1.2 Action upon Receipt

When an IA-BIND request is invoked, the supporting service will attempt to create an instance of the supporting service. If the supporting service is being provided by the outer ASO's CF, this may lead to a new lower-level association being created or the request may be mapped to an existing, lower-level association. The supporting service cannot map this request to any instance of a supporting association that is in the RELEASE PENDING state.

8.1.2 IA-BIND-REQUEST.deliver

This primitive is invoked to notify a recipient ACPM of a new distinct instance of the supporting service that will deliver APDUs to this ACPM.

8.1.2.1 When Invoked

The recipient ACPM will be in the Idle-Unassociated (STA0) state. The supporting service will be in the ASSOCIATION PENDING or ESTABLISHED state.

8.1.2.2 Action upon Receipt

When this primitive is invoked, the recipient ACPM will determine if it is willing to accept this new supporting service. (This determination is specific to the design of the ASO.)

The ACPM invokes a local directory function with the called naming fields (AP-title, AE-qualifier, AP-invocation-identifier, AE-invocation-identifier, and ASOI-tag) to determine the ASO to which the enclosed AARQ is destined, [for a discussion of (N)-directory-functions, (see ITU-T Rec. X.650 | ISO/IEC 7498-3]. If the called naming fields indicate that it is this ASO (which will always be the case unless the higher-level functional unit is selected), then processing of the AARQ continues. If the naming fields refer to a child ASO of this parent, then the AARQ is passed to this ASO; otherwise, the association request is refused and an appropriate AARE is returned to the sender.

8.1.3 IA-BIND request Parameters

The parameters of these primitives contain the parameters necessary to specify the characteristics of the supporting association or connection and are listed in Table 11.

Table 11 – Parameters of the IA-BIND primitives

Parameter	Notes	Req.sub	Req.del	Rsp.sub	Rsp.del
Calling AP-title	1	U	C(=)		
Calling AP-invocation-identifier	1	U	C(=)		
Calling ASOI-tag	1	U	C(=)		
Called AP-title	1	U	C(=)		
Called AP-invocation-identifier	1	U	C(=)		
Called ASOI-tag	1	U	C(=)		
Responding AP-title	1			U	C(=)
Responding AP-invocation-identifier	1			U	C(=)
Responding ASOI-tag	1			U	C(=)
Calling-presentation-address	2	P	P		
Called-presentation-address	2	P	P	P	P
Responding-presentation-address	2			P	P
Presentation context definition list		U	C		
Presentation context result list				U	C
Default presentation context name		U	C		
Default presentation context result				C	C
Quality of service	3	P	P	P	P
Presentation requirements	3	P	P	P	P
Session requirements	3	P	P	P	P
Initial synchronization point serial number	3	P	P	P	P
Initial assignment of tokens	3	P	P	P	P
Session connection identifier	3	P	P	P	P
User-summary		U	C(=)	U	C(=)
User-information		U	C(=)	U	C(=)

NOTE 1 – This parameter is absent unless if the Higher-Level Association functional unit is selected on the supported association.

NOTE 2 – This parameter is absent unless the supported association is the outermost association (i.e. the instance of the supporting service will be a Presentation connection that is not nested).

NOTE 3 – This parameter is not present if the Higher-Level Association functional unit is selected on the association.

8.1.4 IA-BIND response

8.1.4.1 IA-BIND-RESPONSE.submit

This primitive is invoked by a responding ACPM to confirm or to deny the use of the supporting service.

8.1.4.1.1 When Invoked

The ACPM will be in the Awaiting A-ASCrsip (STA2) state and the supporting service will be in the ASSOCIATION PENDING or ESTABLISHED state.

8.1.4.1.2 Action upon Receipt

The supporting service will respond to the initiating peer indicating the success or failure in establishing the supporting service. If the request for supporting service was successful, the instance of the supporting service transitions to the ESTABLISHED state and the responding ACPM transitions to the Associated (STA5) state. If the request is not successful, the instance of the supporting service transitions to the NULL state and the ACPM transitions to the Idle-Unassociated (STA0) state.

8.1.5 IA-BIND-RESPONSE.deliver

8.1.5.1 When Invoked

This primitive is invoked when the ACPM is in the Awaiting AARE (STA3) state and the supporting service must notify the ACPM of the acceptance or refusal of an instance of the supporting service.

8.1.5.2 Action upon Receipt

If the supporting service has been accepted, the AARE is delivered to the ACPM and the supporting service transitions to the ESTABLISHED state. The ACPM is able to use the association. If not accepted, the supporting service transitions to the NULL state.

8.1.6 IA-BIND response Parameters

The parameters of these primitives contain the parameters necessary to specify the characteristics of the supporting association or connection and are listed in Table 11.

8.2 IA-DATA

8.2.1 IA-DATA.submit

8.2.1.1 When Invoked

This primitive may be invoked when ACPM is in the Awaiting AARE (STA1) or Associated (STA5) state and the supporting service is in the ASSOCIATION PENDING or ESTABLISHED states.

8.2.1.2 Action upon Receipt

When this primitive is invoked, the supporting service conveys the contents of the service primitive to the recipient.

8.2.2 IA-DATA.deliver

8.2.2.1 When Invoked

This primitive is invoked when the supporting service is in the ESTABLISHED state.

8.2.2.2 Action upon Receipt

The contents of the User data parameter are delivered to the using ASO.

8.2.3 IA-DATA Parameters

The parameters of these primitives consist of the parameters of the A-DATA primitives.

8.3 IA-ALTER-CONTEXT (optional)

8.3.1 IA-ALTER-CONTEXT-REQUEST.submit

8.3.1.1 When Invoked

This primitive may be invoked when the ACPM is in the Awaiting AARE (STA1) or Associated (STA5) state and the supporting service is in the ASSOCIATION PENDING state or the ESTABLISHED state.

8.3.1.2 Action upon Receipt

When this primitive is invoked, the supporting service is requested to change the ASO-context or the P-context of the supporting service.

8.3.2 IA-ALTER-CONTEXT-REQUEST.deliver**8.3.2.1 When Invoked**

This primitive is invoked when the supporting service is in the ESTABLISHED state to notify the supported ACPM that the ASO-context or P-context of the supporting service has been changed.

8.3.2.2 Action upon Receipt

When this primitive is invoked, the supporting service notifies the supported service that there has been a request to change the ASO-context or P-context of the supported service.

8.3.3 IA-ALTER-CONTEXT-RESPONSE.submit**8.3.3.1 When Invoked**

This primitive may be invoked when the ACPM is in the Associated (STA5) state and the supporting service is in the ESTABLISHED state.

8.3.3.2 Action upon Receipt

When this primitive is invoked, the ACPM is either accepting or rejecting the requested change to the ASO-context or P-context of the supporting service. If the change is accepted the new context is in effect; otherwise there is no change in the context.

8.3.4 IA-ALTER-CONTEXT-RESPONSE.deliver**8.3.4.1 When Invoked**

This primitive is invoked to notify the A-ALTER-CONTEXT request the result of the request.

8.3.4.2 Action upon Receipt

If the request was accepted, the ASO can assume that the context change has been made. If the request was rejected, the ASO assumes that the context is unchanged.

8.3.5 IA-ALTER-CONTEXT Parameters

The parameters of these primitives consist of the parameters of the A-ALTER-CONTEXT primitives necessary to specify context changes to the supporting service.

8.4 IA-ABORT**8.4.1 IA-ABORT.submit****8.4.1.1 When Invoked**

This primitive is invoked by the ASO to notify the supporting service that the supported service has been aborted.

NOTE – This allows the supporting service to determine whether its use of supporting associations or connections should also be aborted.

8.4.1.2 Action upon Receipt

This primitive is invoked to notify the supporting service that there has been a request to abort the supported ASO-association. An IA-ABORT.submit may be invoked when either ACPM is in any state. The ACPM transitions to the NULL state.

8.4.2 IA-ABORT.deliver**8.4.2.1 When Invoked**

This primitive is invoked to notify the ACPM that the supporting service has aborted the instance of the supporting service.

8.4.2.2 Action upon Receipt

The instance of the supporting service transitions to the NULL state. The ACPM transitions to the Idle-Unassociated (STA0) state.

8.4.3 IA-ABORT Parameters

The parameters of these primitives consist of the parameters of the A-ABORT primitives necessary to notify the supporting service.

8.5 IA-RELEASE

8.5.1 IA-RELEASE-REQUEST.submit

8.5.1.1 When Invoked

This primitive is invoked to notify the supporting service that the ACPM is requesting the release of the supported association. The ACPM transitions to the Awaiting RLRE (STA3) state.

8.5.1.2 Action upon Receipt

When this primitive is generated, then the supporting service conveys the RLRQ APDU (passed as User-information) to the peer ACPM.

8.5.2 IA-RELEASE-REQUEST.deliver

8.5.2.1 When Invoked

This primitive is invoked when an RLRQ APDU (received as User-information/User data) is delivered to the ACPM. The ACPM will be in the Associated (STA5) state or the Awaiting RLRE (STA3) state.

8.5.2.2 Action upon Receipt

If the ACPM is in the Associated (STA5) state, it transitions to the Awaiting RLRE (STA4) state. See Annex A for state transitions in the release-collision case.

8.5.3 IA-RELEASE-ACCEPT.submit

8.5.3.1 When Invoked

This primitive is invoked to notify the supporting service that peer ACPM has accepted the release of the supported association.

8.5.3.2 Action Upon Receipt

When this primitive is received, the contents of the User-information field (an RLRE) are sent to the peer. The ACPM will issue an IA-UNBIND.submit and transitions to the Idle-Unassociated (STA0) state (unless a release collision occurred – see Annex A).

8.5.4 IA-RELEASE-REFUSE.submit

8.5.4.1 When Invoked

This primitive is invoked to notify the supporting service that the request for the release of the supported association has been refused.

8.5.4.2 Action upon Receipt

The ACPM transitions to the Associated (STA5) state.

8.5.5 IA-RELEASE-ACCEPT.deliver

8.5.5.1 When Invoked

This primitive is invoked when an RLRE APDU (received as User-information/User Data) with result "affirmative" is delivered to the ACPM. The ACPM will be in the Awaiting RLSrsp (STA4) state, or one of the collision-resolution states.

8.5.5.2 Action Upon Receipt

The ACPM will issue an IA-UNBIND.submit and transitions to the Idle-Unassociated (STA0) state (unless a release collision occurred – see Annex A)

8.5.6 IA-RELEASE-REFUSE.submit

8.5.6.1 When Invoked

This primitive is invoked when an RLRE APDU (received as User-information/User data) with result "negative" is delivered to the ACPM. The ACPM will be in the Awaiting RLSrsp (STA4) state, or one of the collision-resolution states.

8.5.6.2 Action upon Receipt

The ACPM transitions to the Associated (STA5) state.

8.6 IA-UNBIND

8.6.1 IA-UNBIND.submit

8.6.1.1 When Invoked

This primitive is invoked to notify the supporting service of the release of the instance of the supported service. The ACPM may be in any state.

8.6.1.2 Action upon Receipt

The ACPM transitions to the Idle-Unassociated (STA0) state. Any action by the supporting service depends on the specification of that ASO.

8.6.2 IA-UNBIND.deliver

8.6.2.1 When Invoked

This primitive is Invoked to notify the ACPM that the instance of the supported service has been terminated (and thus there is no longer a local context for the issue or receipt of APDUs on the supported association).

8.6.2.2 Action upon Receipt

When the ACPM receives an IA-UNBIND.deliver, it is notified that the instance of the supporting association has terminated. The ACPM transitions to the Idle-Unassociated (STA0) state.

8.6.3 IA-UNBIND Parameters

This primitive has a provider-reason parameter.

9 Syntax of ACSE

9.1 Structure of ACSE APDUs

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

```
ACSE-1 { joint-iso-itu-t association-control(2) modules(0) acse1(1) version1(1) }
  -- ACSE-1 refers to ACSE version 1
```

```
DEFINITIONS ::=
```

```
BEGIN
```

```
IMPORTS Name, RelativeDistinguishedName
```

```
FROM InformationFramework
```

```
{ joint-iso-ccitt ds(5) module(1) informationFramework(1) 2 };
```

-- The data types Name and RelativeDistinguishedName are imported from
 -- ITU-T Rec. X.501 | ISO/IEC 9594-2.
 -- object identifier assignments

acse-as-id OBJECT IDENTIFIER ::=
 { joint-iso-itu-t association-control(2) abstract-syntax(1) apdus(0) version1(1) }
 -- may be used to reference the abstract syntax of the ACSE APDUs.

aCSE-id OBJECT IDENTIFIER ::=
 { joint-iso-itu-t association-control(2) ase-id(3) acse-ase(1) version(1) }
 -- may be used to identify the Association Control ASE.
 -- top level CHOICE

ACSE-apdu ::= CHOICE

```
{
  aarq AARQ-apdu,
  aare AARE-apdu,
  rlrq RLRQ-apdu,
  rlre RLRE-apdu,
  abrt ABRT-apdu,
  ... ,
```

-- Extensions for higher level association FU

```
  adt A-DT-apdu,
  acrq ACRQ-apdu,
  acrp ACRP-apdu
}
```

AARQ-apdu ::= [APPLICATION 0] IMPLICIT SEQUENCE

```
{ protocol-version      [0]      IMPLICIT BIT STRING
  { version1 (0) }
  DEFAULT { version1 },
  aSO-context-name     [1]      ASO-context-name,
  called-AP-title      [2]      AP-title OPTIONAL,
  called-AE-qualifier  [3]      AE-qualifier OPTIONAL,
  called-AP-invocation-identifier [4] AP-invocation-identifier OPTIONAL,
  called-AE-invocation-identifier [5] AE-invocation-identifier OPTIONAL,
  calling-AP-title     [6]      AP-title OPTIONAL,
  calling-AE-qualifier [7]      AE-qualifier OPTIONAL,
  calling-AP-invocation-identifier [8] AP-invocation-identifier OPTIONAL,
  calling-AE-invocation-identifier [9] AE-invocation-identifier OPTIONAL,
```

-- The following field shall not be present if only the Kernel is used.

```
sender-acse-requirements [10]    IMPLICIT ACSE-requirements OPTIONAL,
-- The following field shall only be present if the Authentication functional unit is selected.
```

```
mechanism-name          [11]    IMPLICIT Mechanism-name OPTIONAL,
-- The following field shall only be present if the Authentication functional unit is selected.
```

```
calling-authentication-value [12] EXPLICIT Authentication-value OPTIONAL,
aSO-context-name-list      [13]    IMPLICIT ASO-context-name-list OPTIONAL,
```

-- The above field shall only be present if the Application Context Negotiation functional unit is selected.

```
implementation-information [29]    IMPLICIT Implementation-data OPTIONAL,
```

....
 -- Extensions for higher level association FU

```
p-context-definition-list [14] Syntactic-context-list OPTIONAL,
```

```
called-asoi-tag          [15] IMPLICIT ASOI-tag OPTIONAL,
```

```
calling-asoi-tag         [16] IMPLICIT ASOI-tag OPTIONAL,
```

-- End of extensions for higher level association FU

```
....
user-information         [30]    IMPLICIT Association-data OPTIONAL
}
```

AARE-apdu ::= [APPLICATION 1] IMPLICIT SEQUENCE

```
{ protocol-version      [0]      IMPLICIT BIT STRING{ version1 (0) }
  DEFAULT { version1 },
  aSO-context-name     [1]      ASO-context-name
  result               [2]      Associate-result,
  result-source-diagnostic [3]    Associate-source-diagnostic,
```

responding-AP-title [4] **AP-title** **OPTIONAL**,
responding-AE-qualifier [5] **AE-qualifier** **OPTIONAL**,
responding-AP-invocation-identifier [6] **AP-invocation-identifier** **OPTIONAL**,
responding-AE-invocation-identifier [7] **AE-invocation-identifier** **OPTIONAL**,
-- *The following field shall not be present if only the Kernel is used.*

responder-acse-requirements [8] **IMPLICIT ACSE-requirements** **OPTIONAL**,
-- *The following field shall only be present if the Authentication functional unit is selected.*

mechanism-name [9] **IMPLICIT Mechanism-name** **OPTIONAL**,
-- *This following field shall only be present if the Authentication functional unit is selected.*

responding-authentication-value [10] **EXPLICIT Authentication-value** **OPTIONAL**,
aSO-context-name-list [11] **IMPLICIT ASO-context-name-list** **OPTIONAL**,
-- *The above field shall only be present if the Application Context Negotiation functional unit is selected.*

implementation-information [29] **IMPLICIT Implementation-data** **OPTIONAL**,
...,
-- *Extensions for higher level association FU*

p-context-result-list [12] **IMPLICIT P-context-result-list** **OPTIONAL**,
called-asoi-tag [13] **IMPLICIT ASOI-tag** **OPTIONAL**,
calling-asoi-tag [14] **IMPLICIT ASOI-tag** **OPTIONAL**,
-- *End of extensions for higher level association FU*

...,
user-information [30] **IMPLICIT Association-data** **OPTIONAL**
}

RLRQ-apdu ::= [APPLICATION 2] IMPLICIT SEQUENCE
{ **reason** [0] **IMPLICIT Release-request-reason** **OPTIONAL**,
...,
-- *Extensions for higher level association FU*

aso-qualifier [13] **ASO-qualifier** **OPTIONAL**,
asoi-identifier [14] **IMPLICIT ASOI-identifier** **OPTIONAL**,
-- *End of extensions for higher level association FU*

...,
user-information [30] **IMPLICIT Association-data** **OPTIONAL**
}

RLRE-apdu ::= [APPLICATION 3] IMPLICIT SEQUENCE
{ **reason** [0] **IMPLICIT Release-response-reason** **OPTIONAL**,
...,
-- *Extensions for higher level association FU*

aso-qualifier [13] **ASO-qualifier** **OPTIONAL**,
asoi-identifier [14] **IMPLICIT ASOI-identifier** **OPTIONAL**,
-- *End of extensions for higher level association FU*

...,
user-information [30] **IMPLICIT Association-data** **OPTIONAL**
}

ABRT-apdu ::= [APPLICATION 4] IMPLICIT SEQUENCE
{ **abort-source** [0] **IMPLICIT ABRT-source**,
abort-diagnostic [1] **IMPLICIT ABRT-diagnostic** **OPTIONAL**,
-- *This field shall not be present if only the Kernel is used.*

...,
-- *Extensions for higher level association FU*

aso-qualifier [13] **ASO-qualifier** **OPTIONAL**,
asoi-identifier [14] **IMPLICIT ASOI-identifier** **OPTIONAL**,
-- *End of extensions for higher level association FU*

...,
user-information [30] **IMPLICIT Association-data** **OPTIONAL**
}

A-DT-apdu ::= [APPLICATION 5] IMPLICIT SEQUENCE
 { aso-qualifier [0] ASO-qualifier OPTIONAL,
 asoi-identifier [1] IMPLICIT ASOI-identifier OPTIONAL,
 ..., ...,
 a-user-data [30] IMPLICIT User-Data }

ACRQ-apdu ::= [APPLICATION 6] IMPLICIT SEQUENCE
 { aso-qualifier [0] IMPLICIT ASO-qualifier OPTIONAL,
 asoi-identifier [1] IMPLICIT ASOI-identifier OPTIONAL,
 aSO-context-name [3] IMPLICIT ASO-context-name OPTIONAL,
 aSO-context-name-list [4] IMPLICIT ASO-context-name-list OPTIONAL,
 p-context-definition-list [5] Syntactic-context-list OPTIONAL,
 ..., ...,
 user-information [30] IMPLICIT User-information OPTIONAL }

ACRP-apdu ::= [APPLICATION 7] IMPLICIT SEQUENCE
 { aso-qualifier [0] ASO-qualifier OPTIONAL,
 asoi-identifier [1] IMPLICIT ASOI-identifier OPTIONAL,
 aSO-context-name [3] IMPLICIT ASO-context-name-list OPTIONAL,
 p-context-result-list [4] IMPLICIT P-context-result-list OPTIONAL,
 ..., ...,
 user-information [30] IMPLICIT User-information OPTIONAL }

ABRT-diagnostic ::= ENUMERATED
 { no-reason-given (1),
 protocol-error (2),
 authentication-mechanism-name-not-recognized (3),
 authentication-mechanism-name-required (4),
 authentication-failure (5),
 authentication-required (6),
 ...
 }

ABRT-source ::= INTEGER { acse-service-user (0), acse-service-provider (1) } (0..1, ...)

ACSE-requirements ::= BIT STRING
 { authentication (0),
 aSO-context-negotiation (1),
 higher-level-association (2),
 nested-association (3)
 }

Application-context-name ::= ASO-context-name

ASO-context-name ::= OBJECT IDENTIFIER
 -- *Application-entity title productions follow (not in alphabetical order).*

AP-title ::= CHOICE {
 ap-title-form1 AP-title-form1,
 ap-title-form2 AP-title-form2,
 ...,
 ap-title-form3 AP-title-form3
 }

AE-qualifier ::= ASO-qualifier

ASO-qualifier ::= CHOICE {
 aso-qualifier-form1 ASO-qualifier-form1,
 aso-qualifier-form2 ASO-qualifier-form2,
 ...,
 aso-qualifier-form3 ASO-qualifier-form3
 }

-- When both AP-title and AE-qualifier data values are present in an AARQ or AARE APDU, both must
 -- have the same form to allow the construction of an AE-title as discussed in CCITT Rec. X.665 /
 -- ISO/IEC 9834-6

AP-title-form1 ::= Name
 -- *The value assigned to AP-title-form1 is The Directory Name of an application-process title.*

ASO-qualifier-form1 ::= RelativeDistinguishedName
 -- *The value assigned to AE-qualifier-form1 is the relative distinguished name of a particular
 -- application-entity of the application-process identified by AP-title-form1.*

AP-title-form2 ::= OBJECT IDENTIFIER

ASO-qualifier-form2 ::= INTEGER

AP-title-form3 ::= PrintableString

ASO-qualifier-form3 ::= PrintableString

AE-title ::= CHOICE {
 ae-title-form1 AE-title-form1,
 ae-title-form2 AE-title-form2,
 ... }

-- 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. However, the following data type is provided for International Standards that reference a single syntactic structure for AE titles.

AE-title-form1 ::= Name

-- For access to The Directory (see ITU-T Rec. X.500 series | ISO/IEC 9594), an AE title has AE-title-form1. This value can be constructed from AP-title-form1 and AE-qualifier-form1 values contained in an AARQ or AARE APDU. A discussion of forming an AE-title-form1 from AP-title-form1 and AE-qualifier-form1 may be found in CCITT Rec X.665 | ISO/IEC 9834-6.

AE-title-form2 ::= OBJECT IDENTIFIER

-- A discussion of forming an AE-title-form2 from AP-title-form2 and AE-qualifier-form2 may be found in CCITT Rec. X.665 | ISO/IEC 9834-6.

AE-invocation-identifier ::= INTEGER

AP-invocation-identifier ::= INTEGER

ASOI-identifier ::= INTEGER (1 .. 128, ...)

ASOI-tag ::= SEQUENCE SIZE (0 .. 7, ...) OF SEQUENCE
 { qualifier [0] ASO-qualifier OPTIONAL,
 identifier [1] ASOI-identifier OPTIONAL }

-- End of Application-entity title productions

ASO-context-name-list ::= SEQUENCE OF ASO-context-name

Syntactic-context-list ::= CHOICE
 { context-list [0] Context-list,
 default-contact-list [1] Default-Context-List
 }

Context-list ::= SEQUENCE OF SEQUENCE
 { pci Presentation-context-identifier,
 abstract-syntax Abstract-syntax-name,
 transfer-syntaxes SEQUENCE OF Transfer-syntax-name}

Default-Context-List ::= SEQUENCE OF SEQUENCE
 { abstract-syntax-name [0] IMPLICIT Abstract-syntax-name OPTIONAL,
 transfer-syntax-name [1] IMPLICIT Transfer-syntax-name
 }

Abstract-syntax-name ::= OBJECT IDENTIFIER

P-context-result-list ::= SEQUENCE OF SEQUENCE
 { result [0] IMPLICIT Result,
 concrete-syntax-name [1] IMPLICIT Concrete-syntax-name OPTIONAL,
 provider-reason [2] IMPLICIT INTEGER
 { reason-not-specified (0),
 abstract-syntax-not-supported (1),
 proposed-transfer-syntaxes-not-supported (2),
 local-limit-on-DCS-exceeded (3) } OPTIONAL
 }

Result ::= INTEGER { acceptance (0),
 user-rejection (1),
 provider-rejection (2)
 }

Concrete-syntax-name ::= Transfer-syntax-name

Transfer-syntax-name ::= OBJECT IDENTIFIER

Associate-result ::= INTEGER
 { accepted (0),
 rejected-permanent (1),
 rejected-transient (2)
 } (0..2, ...)

Associate-source-diagnostic ::= CHOICE
 { acse-service-user [1] INTEGER
 { null (0),
 no-reason-given (1),
 application-context-name-not-supported (2),
 calling-AP-title-not-recognized (3),
 calling-AP-invocation-identifier-not-recognized (4),
 calling-AE-qualifier-not-recognized (5),
 calling-AE-invocation-identifier-not-recognized (6),
 called-AP-title-not-recognized (7),
 called-AP-invocation-identifier-not-recognized (8),
 called-AE-qualifier-not-recognized (9),
 called-AE-invocation-identifier-not-recognized (10),
 authentication-mechanism-name-not-recognized (11),
 authentication-mechanism-name-required (12),
 authentication-failure (13),
 authentication-required (14)
 } (0..14, ...),
 acse-service-provider [2] INTEGER
 { null (0),
 no-reason-given (1),
 no-common-acse-version (2)
 } (0..2, ...)
 }

User-information ::= Association-data

Association-data ::= SEQUENCE SIZE (1, ..., 0 | 2..MAX) OF EXTERNAL

Simply-encoded-data ::= OCTET STRING

User-Data ::= CHOICE {
 user-information User-information,
 simply-encoded-data Simply-encoded-data,
 fully-encoded-data [0] PDV-list
 }

-- see ITU-T Rec. X.226 | ISO/IEC 8823-1.

PDV-list ::= SEQUENCE {
 transfer-syntax-name Transfer-syntax-name OPTIONAL,
 presentation-context-identifier Presentation-context-identifier,
 presentation-data-values CHOICE {
 simple-ASN1-type [0] ABSTRACT-SYNTAX.&Type
 (CONSTRAINED BY {

-- Type corresponding to presentation context identifier

}),
 octet-aligned [1] IMPLICIT OCTET STRING,
 arbitrary [2] IMPLICIT BIT STRING }

-- see ITU-T Rec. X.226 | ISO/IEC 8823-1.

}

Presentation-context-identifier ::= INTEGER

Authentication-value ::= CHOICE

{ charstring [0] IMPLICIT GraphicString,
 bitstring [1] IMPLICIT BIT STRING,
 external [2] IMPLICIT EXTERNAL,
 other [3] IMPLICIT SEQUENCE {
 other-mechanism-name MECHANISM-NAME.&id ({ObjectSet}),
 other-mechanism-value MECHANISM-NAME.&Type ({ObjectSet}{@.other-mechanism-name})
 }
 }

- The abstract syntax of (calling/responding) authentication-value is determined by the authentication mechanism used
- during association establishment. The authentication mechanism is either explicitly denoted by the &id field (of type
- OBJECT IDENTIFIER) for a mechanism belonging to the class MECHANISM-NAME, or it is known implicitly by
- prior agreement between the communicating partners. If the "other" component is chosen, then the
- "mechanism-name" component must be present in accordance with ITU-T Rec. X.680 | ISO/IEC 8824-1. If the value
- "mechanism-name" occurs in the AARQ-apdu or the AARE-apdu, then that value must be the same as the value for
- "other-mechanism-name".

Implementation-data ::= GraphicString

Mechanism-name ::= OBJECT IDENTIFIER

MECHANISM-NAME ::= TYPE-IDENTIFIER

ObjectSet MECHANISM-NAME ::= {...}

Release-request-reason ::= INTEGER

{ normal (0),
 urgent (1),
 user-defined (30) }
 (0 | 1 | 30, ...)

Release-response-reason ::= INTEGER

{ normal (0),
 not-finished (1),
 user-defined (30) }
 (0 | 1 | 30, ...)

END

10 Conformance

A system claiming to implement the procedures specified in this Recommendation | International Standard 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 association-initiator, or association-responder, or both;
- b) that the system supports version 1 of this protocol; and
- c) which of the following optional functional units are supported:
 - Authentication;
 - ASO-context negotiation;
 - Higher Level Association;
 - Nested Association.

10.2 Static requirements

The use of the Association Control Service Element is required for an ASO to meet the minimum requirements for establishing and releasing communication with a peer entity.

The system shall:

- a) act in the role of an association-initiator (by sending an AARQ APDU), or in the role of an association-acceptor (by responding properly to an AARQ APDU with an appropriate AARE APDU), or act in both roles; and
- b) support (as a minimum) encoding which results from applying the basic ASN.1 encoding rules to the ASN.1 specified in clause 9 for the purpose of exchanging 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 supporting service and to ACSE defined in 8.1 to clause 9.

The requesting AE may choose to send either form1 or form2 for AP-title and AE-qualifier. The accepting AE may respond with either form. Thus, both the requesting and responding AE must be capable of receiving both forms.

- c) state which of the following optional functional units are supported:
 - Authentication;
 - ASO-context negotiation;
 - Higher Level Association;
 - Nested Association.

11 Precedence

The aspects of the protocol for ACSE are specified in several clauses in this Recommendation | International Standard. This clause states the rules of precedence for possible situations where the same aspect may be specified in more than one place in an apparently inconsistent manner. The relevant aspects of protocol specification covered are:

- a) sequencing rules;
- b) mapping to the supporting service; and
- c) structure and encoding of ACSE APDUs.

Annex A and clause 7 specify the elements of procedure which govern the behaviour of the ACPM. Annex A takes precedence over any other clause in this Recommendation | International Standard which may state or imply apparently inconsistent sequencing rules.

Clause 8 specifies how the supporting service primitives are used by the ACPM. Clause 8 takes precedence over any other part of this Recommendation | International Standard which may state or imply mapping to the supporting-service.

Clause 9 specifies the structure of ACSE APDUs. Clause 9 takes precedence over any other part of this Recommendation | International Standard which may state or imply structure of ACSE APDUs.

NOTE – Any person encountering an inaccuracy or ambiguity in this Recommendation | International Standard is requested to notify their National Body of ISO without delay in order that the matter may be investigated and appropriate action taken.

12 Registration requirements

This Recommendation | International Standard identifies the requirement to register four types of information objects: application titles; ASO-contexts; and authentication-mechanisms; and upper-layer context specifications. Each is discussed below.

No International Registration Authority is currently planned for the registration of any of the above objects. The assignment of a name to any of these objects shall be in accordance with the general provisions of CCITT Rec. X.660 | ISO/IEC 9834-1, except as specified below.

In accordance with CCITT Rec. X.660 | ISO/IEC 9834-1, an organization that wishes to assign names to objects shall find an appropriate superior of the naming tree. The superior assigns an arc of the naming tree to the organization. The organization can then assign names below that arc.

NOTE – Appropriate superiors in the registration tree include ISO/IEC national bodies, organizations with International Code Designators assigned in accordance with ISO 6523, as well as ITU-T network Administrations, and recognized operating agencies (ROAs).

12.1 Application titles

The application titles requiring registration are application-process title, application-entity qualifier, and application-entity title. The registration requirements for these information objects are contained in ITU-T Rec. X.207 | ISO/IEC 9545, clause 9. ITU-T Rec. X.665 | ISO/IEC 9834-6 specifies both the relationship between these information objects and the procedures to register them.

12.2 ASO-context

The registration requirements for an ASO-context is contained in ITU-T Rec. X.207 | ISO/IEC 9545, clause 9. CCITT Rec. X.660 | ISO/IEC 9834-1 specifies the procedures to register it.

12.3 Authentication-mechanism

An authentication-mechanism may be specified as part of a Recommendation | International Standard. For example, Annex B includes an authentication-mechanism based on AE-title and password. Such an authentication-mechanism is, in effect, specified and registered within this Recommendation | International Standard.

An authentication-mechanism may also be specified outside of Recommendations | International Standards. In this situation, CCITT Rec. X.660 | ISO/IEC 9834-1 specifies the procedures to register such an authentication-mechanism.

12.4 Upper-layer context specifications

An upper-layer context specification is a definition of all the field values that are required to format the full-form ACSE, presentation, and session establishment PDUs for a given application context and a given peer presentation address.

NOTE – In practice, it is expected that an upper-layer context specification will be parameterized to allow for values which may be expected to be different for each establishment exchange between two peers (e.g. ACSE user information), or for the same application between different peers (e.g. addressing information).

An upper-layer context specification may be specified as part of an Recommendation | International Standard.

An upper-layer context specification may also be specified outside of Recommendations | International Standards. In this situation, CCITT Rec. X.660 | ISO/IEC 9834-1 specifies the procedures to register such an upper-layer context specification.

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Annex A

ACPM state table

(This annex forms an integral part of this Recommendation | International Standard)

A.1 General

A.1.1 This annex defines a single Association Control Protocol Machine (ACPM) in terms of a state table. The state table shows the interrelationship between the state of an ACPM, the incoming events that occur in the protocol, the actions taken, and, finally, the resultant state of the ACPM.

A.1.2 The ACPM state table does not constitute a formal definition of the ACPM. It is included to provide a more precise specification of the elements of procedure defined in clause 7.

A.1.3 This annex contains the following tables:

- a) Table A.1 specifies the abbreviated name, source, and name/description of each incoming event. The sources are:
 - 1) ACSE service-user (AC-user);
 - 2) Peer ACPM (AC-peer); and
 - 3) IA service-provider (IA-provider).
- b) Table A.2 specifies the abbreviated name of each state.
- c) Table A.3 specifies the abbreviated name, target, and name/description of each outgoing event. The targets are:
 - 1) ACSE service-user (AC-user); and
 - 2) peer ACPM (AC-peer).
- d) Table A.4 specifies the predicates.
- e) Table A.5 specifies the ACPM state table using the abbreviations of the above tables.

A.2 Conventions

A.2.1 The intersection of an incoming event (row) and a state (column) forms a cell.

A.2.2 In the state table, a blank cell represents the combination of an incoming event and a state that is not defined for the ACPM (see A.3.1).

A.2.3 A non-blank cell represents an incoming event and state that is defined for the ACPM. Such a cell contains one or more action lists. An action list may be either mandatory or conditional. If a cell contains a mandatory action list, it is the only action list in the cell.

A.2.4 A mandatory action list contains:

- a) an outgoing event; and
- b) a resultant state.

A.2.5 A conditional action list contains:

- a) a predicate expression comprising predicates and Boolean operators (^ represents the Boolean NOT); and
- b) a mandatory action list. (This mandatory action list is used only if the predicate expression is true.)

A.3 Actions to be taken by the ACPM

The ACPM state table defines the action to be taken by the ACPM in terms of an outgoing event and the resultant state of the ACPM.

A.3.1 Invalid intersections

Blank cells indicate an invalid intersection of an incoming event and state. If such an intersection occurs, one of the following actions is taken:

- if the incoming event comes from the ACSE service-user, any action taken by the ACPM is a local matter;
- if the incoming event is related to a received APDU or IA-provider event, the ACPM issues both an A-ABRind outgoing event (to its AC-user) and an ABRT outgoing event (to its peer ACPM).

A.3.2 Valid intersections

If the intersection of the state and incoming event is valid, one of the following actions is taken:

- if a cell contains a mandatory action list, the ACPM takes the actions specified;
- if a cell contains one or more conditional action lists, for each predicate expression that is true, the ACPM takes the actions specified. If none of the predicate expressions are true, the ACPM takes one of the actions defined in A.3.1.

A.4 Relationship to Presentation and other ASEs

The ACPM state table (see Table A.5) only defines the interactions of the ACPM, its ACSE service-user and the presentation-services used by the ACPM.

NOTE – The occurrence of other events from the presentation-service or other application-service-elements is not included in the ACPM state Table A.5 because they do not affect the ACPM.

Table A.1 – Incoming event list

Abbreviated name	Source	Name and description
A-ASCreq	AC-user	A-ASSOCIATE request primitive
A-ASCrsp+	AC-user	A-ASSOCIATE response primitive (accepted)
A-ASCrsp-	AC-user	A-ASSOCIATE response primitive (rejected)
AARQ	AC-peer	A-ASSOCIATE request APDU
AARE+	AC-peer	A-ASSOCIATE-RESPONSE APDU (accepted)
AARE-	AC-peer	A-ASSOCIATE-RESPONSE APDU (rejected)
SupportCnf	IA-BIND-RESPONSE.deliver	P-CONNECT, A-ASSOCIATE APDU, or A-DATA APDU
A-DTreq	AC-user	A-DATA request primitive
DT	AC-peer	A-DATA APDU
A-ACRQreq	AC-user	A-ALTER-CONTEXT request primitive
A-ACRQrsp	AC-user	A-ALTER-CONTEXT response primitive
ACRQ	AC-peer	A-ALTER-CONTEXT APDU
ACRP	AC-peer	A-ALTER-CONTEXT-RESPONSE APDU
A-RLSreq	AC-user	A-RELEASE request primitive
A-RLSrsp+	AC-user	A-RELEASE response primitive (accepted)
A-RLSrsp-	AC-user	A-RELEASE response primitive (rejected)
RLRQ	AC-peer	A-RELEASE APDU
RLRE+	AC-peer	A-RELEASE APDU (accepted)
RLRE-	AC-peer	A-RELEASE APDU (rejected)
A-ABRreq	AC-user	A-ABORT request primitive
ABRT ^{a)}	AC-peer	A-ABORT APDU
supportingAB	IA-ABT.deliver	P-P-ABORT or A-ABORT
EXTERN	Supporting Upper Layers	External Event
^{a)} When supported by version 1 of the session protocol (ISO/IEC 8327), the A-ABORT APDU has no APCI. The receipt of the P-U-ABORT indication implies its existence.		

Table A.2 – ACPM states

Abbreviated name	Description
STA0	Idle: Unassociated
STA1	Awaiting AARE APDU
STA2	Awaiting A-ASSOCIATE response
STA3	Awaiting RLRE APDU
STA4	Awaiting A-RELEASE response
STA5	Associated
STA6	Awaiting A-RELEASE response (Association-initiator)
STA7	Awaiting RLRE APDU (Association-responder 1)
STA8	Awaiting RLRE APDU (Association-responder 2)

Table A.3 – Outgoing event list

Abbreviated name	Target	Name and description
A-ASCind	AC-user	A-ASSOCIATE indicate primitive
A-ASCcnf+	AC-user	A-ASSOCIATE confirm primitive (accepted)
A-ASCcnf-	AC-user	A-ASSOCIATE confirm primitive (rejected)
AARQ	AC-peer	A-ASSOCIATE request primitive
AARE+	AC-peer	A-ASSOCIATE-RESPONSE APDU (accepted)
AARE-	AC-peer	A-ASSOCIATE-RESPONSE APDU (rejected)
A-DTind	AC-user	A-DATA indicate primitive
DT	AC-peer	A-DATA APDU
A-ACRQind	AC-user	A-ALTER-CONTEXT indicate primitive
A-ACRQcnf	AC-user	A-ALTER-CONTEXT confirm primitive
ACRQ	AC-peer	A-ALTER-CONTEXT APDU
ACRP	AC-peer	A-ALTER-CONTEXT-RESPONSE APDU
A-RLSind	AC-user	A-RELEASE indicate primitive
A-RLScnf+	AC-user	A-RELEASE confirm primitive (accepted)
A-RLScnf-	AC-user	A-RELEASE confirm primitive (rejected)
RLRQ	AC-peer	A-RELEASE APDU
RLRE+	AC-peer	A-RELEASE APDU (accepted)
RLRE-	AC-peer	A-RELEASE APDU (rejected)
A-ABRind	AC-user	A-ABORT indicate primitive
ABRT ^{a)}	AC-peer	A-ABORT APDU
P-P-ABind	AC-user	A-P-ABORT indicate primitive

^{a)} When supported by version 1 of the session protocol (ISO/IEC 8327), the A-ABORT APDU has no APCI. The receipt of the P-U-ABORT indication implies its existence.

Table A.4 – Predicates

Code	Meaning
p1	ACPM can support requested association
p2	ACPM originated this association

Table A.5 – ACPM state table

	STA0 Idle- Unassoc	STA1 Awaiting AARE	STA2 Awaiting A-ASCrsp	STA3 Awaiting RLRE	STA4 Awaiting A-RLSrsp	STA5 Associated	STA6 Collision assoc-init	STA7 Coll rsp1	STA8 Coll rsp2
A-ASCreq	p1 AARQ STA1								
A-ASCrsp+			AARE+ STA5 (Note)						
A-ASCrsp-			AARE- STA0						
AARQ	p1 A-ASCind STA2 ^p1 AARE- STA0								
AARE+		A-ASCcnf+ STA5							
AARE-		A-ASCcnf- STA0							
SupportCnf		A-ASCcnf- STA0							
A-DTreq		A-DT STA1	A-DT STA2			A-DT STA5			
DT			(Note) STA2			A-DTind STA5			
A-ACRQreq		ACRQ STA1				ACRQ STA5			
A-ACRQrsp						ACRP STA5			
ACRQ			(Note) STA2			A-ACRQind STA5			
ACRP						A-ACRPind STA5			
A-RLSreq						RLRQ STA3			
A-RLSrsp+					RLRE+ STA0		RLRE+ STA3	STA8	
A-RLSrsp-					RLRE- STA5				
RLRQ				p2 A-RLSind STA6 ^p2 A-RLSind STA7		A-RLSind STA4			
RLRE+				A-RLScnf+ STA0				A-RLScnf+ STA4	A-RLScnf+ RLRE+ STA0
RLRE-				A-RLScnf- STA5					
A-ABRreq		ABRT STA0	ABRT STA0	ABRT STA0	ABRT STA0	ABRT STA0	ABRT STA0	ABRT STA0	ABRT STA0
ABRT ^{a)}		A-ABRind STA0	A-ABRind STA0	A-ABRind STA0	A-ABRind STA0	A-ABRind STA0	A-ABRind STA0	A-ABRind STA0	A-ABRind STA0
supporting ABRT		SupABind STA0	SupABind STA0	SupABind STA0	SupABind STA0	SupABind STA0	SupABind STA0	SupABind STA0	Sup ABind STA0
EXTRN-1				STA5		STA5			
EXTRN-2					STA5	STA5			

^{a)} When supported by version 1 of the session protocol (ISO/IEC 8327), the A-ABORT APDU has no APCI. The receipt of the P-U-ABORT indication implies its existence.

NOTE – The DATA and ALTER CONTEXT indications are queued by the receiving ACPM and only delivered when a A-ASCrsp+ is received.

Annex B³⁾**Authentication-mechanism using password**

(This annex forms an integral part of this Recommendation | International Standard)

B.0 Introduction

This annex specifies a simple authentication-mechanism that uses a password with an AE-Title. This authentication-mechanism is intended for general use. It is also an example of an authentication-mechanism specification.

B.1 Assigned name

The following name (of ASN.1 datatype OBJECT IDENTIFIER) is assigned to this authentication-mechanism:

```
{ joint-iso-ccitt
  association-control (2)
  authentication-mechanism (3)
  password-1 (1)
}
```

B.2 Authentication-value ASN.1 datatype

For this authentication-mechanism, the password is the authentication-value. The data type of authentication-value shall be "GraphicString" in accordance with the production for "authentication-value" in clause 9.

B.3 Processing specification

In this annex, the term "sending" denotes the AEI (or its authentication-function) requesting authentication by its peer. The term "receiving" denotes the AEI (or its authentication-function) performing authentication of its peer.

B.3.1 Requesting authentication

The sending authentication-function retrieves a password value from stored data for its AEI to be corroborated by the receiving AEI. The password value is mapped to the datatype of the authentication-value defined in B.2.

When the A-ASSOCIATE request or response primitive is issued by the sending AEI, the Authentication-value parameter shall contain this value. The primitive shall also contain the appropriate AP-title and AE-qualifier parameters that indicates its AE-title.

Depending on prior agreements between the sending and the receiving AE, the authentication-mechanism name (defined in B.1) may or may not be included on the A-ASSOCIATE primitive.

B.3.2 Performing authentication

The receiving authentication-function receives the Authentication-value parameter value on the incoming A-ASSOCIATE indication or confirm primitive.

Depending on prior agreements between the sending and the receiving AE, the authentication-mechanism Name (defined in B.1) may or may not be included on the A-ASSOCIATE primitive.

If an authentication-mechanism Name is required but not received, the authentication-function indicates that an A-ABORT request primitive shall be issued. The Diagnostic parameter value shall indicate "authentication-mechanism Name required."

If an authentication-mechanism Name is included, it shall be semantically equivalent to that specified in B.1. If this authentication-mechanism Name is not correct, the authentication-function indicates that an A-ABORT request primitive shall be issued. The Diagnostic parameter value shall indicate "authentication-mechanism Name not recognized."

³⁾ The implementation of the authentication-mechanism specified in this annex is not required for conformance to this Protocol Specification. However, if employed, the entire specification is binding for the authentication-functions in both AEIs.

The authentication-function then determines if this authentication-mechanism (i.e. the authentication-mechanism defined in this annex) is allowed for the sending AEI based on the AE-Title of the sending AEI. If this authentication-mechanism is not allowed, the authentication-function indicates that an A-ABORT request primitive shall be issued. The Diagnostic parameter value shall indicate "authentication failure".

If this authentication-mechanism is allowed for the sending AEI, the authentication-function compares the value of the Authentication-value parameter against its stored data for this mechanism based on the sender's AE-title. If the two are semantically equivalent, the authentication-function shall indicate successful authentication.

If the two values are not semantically equivalent, the authentication-function indicates that an A-ABORT request primitive shall be issued. The diagnostic parameter value shall indicate "authentication failure".

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Annex C

Definition of the IA-service mapping to the Presentation service

(This annex forms an integral part of this Recommendation | International Standard)

C.1 Procedures for Lower Boundary Mapping the Presentation service

This annex defines the specific lower boundary mapping to be used when using the Presentation service as a supporting service, as well as specific constraints on the use of Session and Presentation. This annex constitutes a specific application of clause 8 of the ACSE Protocol Specification and defines the lower mapping of ACSE to the Presentation service.

C.2 Use of the Presentation service

C.2.1 General

When the Presentation service is used as the supporting service for ACSE, there is a one-to-one correspondence between the ASO-association and a presentation-connection. The presentation-connection is established at the same time as the ASO-association, and the normal or abnormal termination of the presentation-connection results in the termination of the ASO-association.

The IA-services representing the use of the supporting service by ACSE uses the P-CONNECT, P-RELEASE, P-U-ABORT and P-P-ABORT services. The IA-service shall be the sole user of these services. Other presentation services are not used, nor is their use constrained. However, the A-RELEASE procedure is disrupted by a request or indication primitive of the P-RESYNCHRONIZE, P-U-EXCEPTION-REPORT or P-P-EXCEPTION-REPORT services.

NOTE – This specification covers only "normal-mode" ACSE. For the specification of ACSE X.410 (1984) and the mapping to X.410-mode Presentation, see ITU-T Rec. X.227 | ISO/IEC 8650-1.

C.2.2 Nested associations

A nested ASO-association has a one-to-one correspondence with a nested presentation-connection. The nesting presentation-connection of this nested presentation-connection shall be the presentation-connection that supports the ASO-association which is the context of the A-ASSOCIATE request for the new nested ASO-association.

The ACPMs of both nested and nesting associations use the normal mode of the presentation-service (see ITU-T Rec. X.216 | ISO/IEC 8822) with the presentation-service Nested-connection functional unit (see ITU-T Rec. X.216/Amd.2 | ISO/IEC 8822/Amd.2). The use of additional presentation-service functional units is an ACSE service-user choice. This choice does not affect the operation of the ACPM.

C.3 Use of the Session service

C.3.1 General

Session version 2 (or higher) shall be used.

NOTE – For the use of ACSE with Session version 1, see ITU-T Rec. X.227 | ISO/IEC 8650-1.

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 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.

An A-ASSOCIATE request to establish an application-association that is intended to be the nesting-association for one or more nested ASO-associations shall include the session Nested-connection functional unit in the Session requirements parameter. An established application association shall only be available for use as a nesting-association if the Nested-connection functional unit has been selected on the underlying session connection.

The rules of the session-service affect the operation of the ACPM and its service-user. The ACSE service-user must be aware of these constraints. This Specification assumes that a local mechanism enforces them. Some examples of session-service constraints that affect the ACSE service-user are:

- a) the availability of negotiated release; and
- b) the possibility of release collisions.

C.3.2 Disruption of A-RELEASE by external event

The normal release procedure is disrupted by the occurrence of an external event (external to the ACPM) resulting from a service primitive of one of the following services:

- a) P-RESYNCHRONIZE; or
- b) P-U-EXCEPTION-REPORT; or
- c) P-P-EXCEPTION-REPORT.

When the normal release procedure is disrupted, the association is again available for use as though the A-RELEASE procedure had not been invoked.

C.4 Mapping to Presentation service

This subclause specifies the mapping of the IA-service supporting normal-mode ACSE to the Presentation service.

C.4.1 IA-BIND-REQUEST.submit

C.4.1.1 Nested association

If the IA-BIND-REQUEST.submit primitive is for a nested association a P-CONNECT request is invoked to establish a nested presentation-connection on the presentation-connection supporting the nesting ASO-association.

The addressing parameters of the IA-BIND-REQUEST.submit primitive are not used in this case.

NOTE – The addressing parameters of the IA-BIND-REQUEST.submit will be equivalent to the addressing parameters of the P-CONNECT primitive that established the outermost nesting presentation-connection.

The other presentation parameters of the IA-BIND are mapped to the corresponding parameters of the P-CONNECT request primitive. The User-information parameter (containing the AARQ) is mapped to the User data parameter of the P-CONNECT request. The requesting ACPM waits for a P-CONNECT confirm primitive from the supporting service and does not accept any other primitive from the requestor other than an A-ABORT request primitive. The ACPM is in the Awaiting AARE (STA1) state.

C.4.1.2 Application-association

If the IA-BIND-REQUEST.submit primitive is issued from an ACPM in the AE or the primitive is issued from an ACPM in an inner ASO and the CF of the enclosing ASO determines that the new association shall be an application-association (i.e. un-nested), then a P-CONNECT request is invoked to establish a new, un-nested presentation-connection using the addressing parameters provided in the IA-BIND request.

The parameters of the IA-BIND are mapped to the corresponding parameters of the P-CONNECT request primitive. The User-information parameter (containing the AARQ) is mapped to the User data parameter of the P-CONNECT request. The Mode parameter shall have the value "normal". The requesting ACPM waits for a P-CONNECT confirm primitive from the supporting service and does not accept any other primitive from the requestor other than an A-ABORT request primitive. The ACPM is in the Awaiting AARE (STA1) state.

C.4.2 IA-BIND-REQUEST.deliver (P-CONNECT indication)

When the supporting service generates a P-CONNECT indication primitive in which the Mode parameter has the value "normal", the primitive and its parameters are mapped to an IA-BIND-REQUEST.deliver.

C.4.3 IA-BIND-RESPONSE.submit

The primitive shall be mapped to a P-CONNECT response primitive to confirm the P-connection using the parameters provided in the IA-BIND-RESPONSE.submit primitive. The User-information parameter (containing the AARE) is mapped to the User data parameter of the P-CONNECT response. The Mode parameter shall have the value "normal".

C.4.4 IA-BIND-RESPONSE.deliver

When the supporting service generates a P-CONNECT confirm primitive in which the Mode parameter has the value "normal", the primitive and its parameters are mapped to an IA-BIND-RESPONSE.deliver

C.4.5 IA-DATA.submit

NOTE – This service is only used if the Higher Level Association functional unit is in use on the supported association.

The CF maps this primitive to a P-DATA request primitive. Because the P-service is blocking, i.e. no data will be sent until the association establishment completes and the ACSE service is not blocking, the CF must queue the IA-DATA until the supporting service, in this case the Presentation service, transitions to the ESTABLISHED state.

C.4.6 IA-DATA.deliver (P-DATA indication, P-RESYNCHRONIZE, P-U-EXCEPTION REPORT, P-P-EXCEPTION REPORT)

NOTE – This service is only used if the Higher Level Association functional unit is in use on the supported association.

This primitive is invoked when a P-DATA indication is received and the Higher Level Association functional unit is selected on the supported association. It is also issued when any Presentation indication or confirm not identified in other subclauses is received and the higher-level functional unit is selected.

The contents of the User data parameter are delivered to the supported ACPM.

C.4.7 A-ALTER-CONTEXT-REQUEST.submit

NOTE – This service is only used if the Higher Level Association functional unit is selected on the supported association.

A P-ALTER-CONTEXT request primitive is invoked using the parameters of the IA-ALTER-CONTEXT-REQUEST.submit primitive.

C.4.8 IA-ALTER-CONTEXT-REQUEST.deliver (P-ALTER-CONTEXT indication)

NOTE – This service is only used if the Higher Level Association functional unit is selected on the supported association.

This primitive is invoked when an P-ALTER-CONTEXT indication is received and the supporting service is in the ESTABLISHED state to notify the using ACSE that the P-context of the supporting service has been changed.

When this primitive is invoked, an IA-ALTER-CONTEXT-RESPONSE.submit primitive to indicate that the recipient ASO accepts the change to the P-context of the supporting service.

C.4.9 IA-ALTER-CONTEXT-RESPONSE.submit

NOTE – This service is only used if the Higher Level Association functional unit is selected on the supported association.

The P-ALTER-CONTEXT-RESPONSE.submit primitive is invoked to confirm (positively or negatively) the change the P-context of the supporting service.

C.4.10 IA-ALTER-CONTEXT-RESPONSE.deliver (P-ALTER-CONTEXT confirm)

NOTE – This service is only used if the Higher Level Association functional unit is selected on the supported association.

This primitive is invoked when an P-ALTER-CONTEXT confirm primitive is received to notify the A-ALTER-CONTEXT request the result of the request.

C.4.10.1 IA-ALTER-CONTEXT Parameters

The parameters of these primitives consist of the naming parameters of the A-ALTER-CONTEXT primitives.

C.4.11 IA-ABORT.submit

This primitive is mapped to a P-U-ABORT request.

C.4.12 IA-ABORT.deliver (P-U-ABORT indication)

When the supporting service generates P-U-ABORT indication, the primitive and its parameters are mapped to an IA-ABORT.deliver. The user data will contain an ABRT APDU.

C.4.13 IA-RELEASE-REQUEST.submit (P-RELEASE request)

The primitive shall be mapped to a P-RELEASE request primitive.

NOTE – The change of state in the Presentation service (and protocol) is not reflected in the simplified state machine of the IA-service.

C.4.14 IA-RELEASE-REQUEST.deliver (P-RELEASE indication)

When the supporting service generates a P-RELEASE indication primitive, the primitive and its parameters are mapped to an IA-RELEASE-REQUEST.deliver.

C.4.15 IA-RELEASE-ACCEPT.submit [P-RELEASE (result = affirmative) response]

The primitive shall be mapped to a P-RELEASE response primitive with a Result parameter set to "affirmative".

C.4.16 IA-RELEASE-ACCEPT.deliver [P-RELEASE confirm (accepted)]

When the supporting service generates a P-RELEASE indication primitive in which the Result parameter has the value "affirmative", the primitive and its parameters are mapped to an IA-RELEASE-REQUEST.deliver.

C.4.17 IA-RELEASE-REFUSE.submit [P-RELEASE (result = negative) response]

The primitive shall be mapped to a P-RELEASE response primitive with a Result parameter set to "negative".

C.4.18 IA-RELEASE-REFUSE.deliver [P-RELEASE confirm (accepted)]

When the supporting service generates a P-RELEASE indication primitive in which the Result parameter has the value "negative", the primitive and its parameters are mapped to an IA-RELEASE-REQUEST.deliver.

C.4.19 A-UNBIND.submit

No action is taken.

NOTE – The Presentation connection will have been terminated by the event which triggered the IA-UNBIND.submit.

C.4.20 IA-UNBIND.deliver (P-P-ABORT indication)

When the supporting service generates a P-P-ABORT indication, the primitive and its parameters are mapped to an IA-UNBIND.deliver.

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Annex D

Definition of the IA-service mapping to ACSE

(This annex forms an integral part of this Recommendation | International Standard)

D.1 Procedures for lower boundary mapping to ACSE or the Presentation service

This subclause defines the specific lower boundary mapping when using the ACSE as a supporting service used with the Higher Level Association functional unit. This annex constitutes a specific application of clause 8 of the ACSE Protocol Specification and defines the lower mapping of ACSE to another ACSE instance of service.

D.2 IA-BIND-REQUEST.submit

D.2.1 When Invoked

This primitive is invoked by an initiating ACSE to request an instance of the supporting service for the ASO-association that it is attempting to create. The initiating ACPM will be in the Awaiting AARE (STA1) state. The supporting service may be in any state except RELEASE PENDING.

D.2.2 Action upon Receipt

When this primitive is received, the CF inspects the naming parameters of the IA-BIND request:

If the ASO-name does not name this ASO, the CF creates a binding between the requesting ASO and this ASO's parent and invokes an IA-BIND request with the same parameters as those received in the IA-BIND request that initiated this procedure.

If the ASO-name does name this ASO or there are no naming parameters nor a Presentation-address, then this ASO is being requested to provide supporting service for a new ASO-association being created by its child ASO.

In this case, the ASO has the choice of creating a new instance of service or mapping this request to an existing ASO-association of its own:

- 1) If it chooses to create a new instance of service, an A-ASSOCIATE request is invoked to create a supporting ASO-association with the ASO described in the naming and addressing parameters passed in the IA-BIND request. The Presentation context definition list parameter of this primitive is set to the P-context required to support the AARQ contained in the IA-BIND request User-information. It is a decision in the design of the ASO whether the IA-BIND request User-information (containing the AARQ) is mapped to the User-information field of the A-ASSOCIATE request or the CF waits for the supporting association to be established and then maps the IA-BIND request User-information to the User data field of an A-DATA request. In most cases, the former will occur.
- 2) If it chooses to map this to an existing instance of service, then the supporting service may be in the Awaiting AARE (STA1) state or the Associated (STA5) state⁴⁾.

If the P-context for the IA-BIND request is NOT part of the Defined Context Set for the supporting association, then:

An A-ALTER-CONTEXT is invoked requesting the P-context for this association. It is a decision in the design of the ASO whether the User-information parameter of the IA-BIND request (containing the AARQ) is placed in the User-information parameter of the A-ALTER-CONTEXT request or mapped to an A-DATA request.

The resulting primitive is invoked.

If the P-context for the protocol of the IA-BIND request is contained in the Defined Context Set for the supporting association, then:

The User-information parameter of the IA-BIND request (containing the AARQ) is placed in the User-information parameter of an A-DATA request and the primitive is invoked.

⁴⁾ If the supporting service is either the Awaiting RLRE (STA3) state or the Collision-association-initialization (STA6) state, the CF cannot use this instance of the service to support the new association.

NOTE – If the ACSE is in STA1 state, then the Defined Context Set will not have been confirmed. The CF should act on the assumption that the P-context proposed in the outstanding AARQ will be accepted. When the supporting ACSE is in the STA1 state, the CF can always wait until the association request has either succeeded (and ACSE is now in STA5 and may send the AARQ), or failed (and ACSE is now in STA0) in which case the point is moot.

If there are ASO-naming parameters, but there is a Presentation-address, see D.2.

D.3 IA-BIND-REQUEST.deliver (A-ASSOCIATE indication)

D.3.1 When Invoked

This primitive is invoked to notify a recipient ACPM that a new distinct instance of the supporting service capable of delivering APDUs to this ACPM is being requested. The recipient ACPM will be in the Idle-Unassociated (STA0) state. The supporting service will be in the ASSOCIATION PENDING state.

D.3.2 Action upon Receipt

When this primitive is invoked, the recipient ACPM will determine if it is willing to accept this new supporting service. The User-information parameter may contain an APDU that will be delivered to the appropriate ASE/ASO⁵⁾. If this is an AARQ, then the naming fields are inspected and the local directory function invoked to determine the ACPM to receive this AARQ. If the naming fields did not specify an ASOI, then an ASOI is created and the AARQ delivered to it. If it did specify an ASOI, then the AARQ is delivered to the ASOI. (The handling of collisions is specific to the design of the ASO.) The ACPM will invoke an IA-BIND-RESPONSE.submit primitive to indicate the acceptance or rejection of the instance of the supporting service.

D.4 IA-BIND-RESPONSE.submit

D.4.1 When Invoked

This primitive is invoked by a responding ACPM to confirm or deny a request for a supporting service. The responding ACPM will be in the Associated (STA5) state, and the supporting service may be in the ASSOCIATION PENDING state or the ESTABLISHED state.

D.4.2 Action upon Receipt

When this primitive is received, the CF will perform one of the following actions:

- 1) If the supporting service is in the Awaiting A-ASCrsp (STA2) or equivalent state, then an A-ASSOCIATE response is invoked to respond to the creation an ASO-association using the naming parameters in the A-ASSOCIATE indication. The Presentation context definition list parameter of the A-ASSOCIATE response is set to the P-context required to support the higher level association being confirmed by the IA-BIND response User-information. It is a decision in the design of the ASO whether the IA-BIND response User-information (containing the AARE) is mapped to the User-information parameter of the A-ASSOCIATE response or the CF waits for the supporting association to be established, i.e. is in the STA5 state, and then maps the IA-BIND response User-information to the User data parameter of an A-DATA request. In most cases, the former will occur.

NOTE – The supporting service must be able to discard any data that arrives after an association request has been refused.
- 2) If the supporting service is in the Associated (STA5) state, then the User-information parameter (containing the AARE) of the IA-BIND-RESPONSE.submit is mapped to the User data field of an A-DATA-REQUEST.submit, or equivalent service of the parent ASO.
- 3) The supporting service cannot be either in the Awaiting A-RLSrsp (STA4) state, or in the Collision-association-initialization (STA6) state or the Collision-associate-response (STA7) state. In this case, the CF should either create a new instance of the supporting service [see 1) and 2) above] or discard the IA-BIND response and generates an IA-ABORT.deliver

⁵⁾ This would frequently be an AARQ, but might be another APDU if the supported association is already established.

D.5 IA-BIND-RESPONSE.deliver (A-ASSOCIATE confirm)

D.5.1 When Invoked

When the supporting service receives an A-ASSOCIATE confirm primitive, the primitive and its parameters are mapped to an IA-BIND-RESPONSE.deliver. This primitive is invoked when the ACPM is either in the Awaiting RLRE state (STA3), or the Associated (STA5) state.

D.5.2 Action upon Receipt

If the supporting service has been accepted, the supporting service transitions to the Associated (STA5) state and the ACPM is able to use this instance of the supporting service. The User-information parameter may contain an APDU that will be delivered to the appropriate ASO⁶⁾.

D.6 IA-DATA.submit

D.6.1 When Invoked

This primitive may be invoked when ACPM is in the Awaiting AARE (STA1) or Associated (STA5) state and the supporting service is in the ASSOCIATION PENDING or ESTABLISHED states.

D.6.2 Action upon Receipt

This primitive is mapped to the User data parameter of an A-DATA.submit primitive of the Supporting ACSE or equivalent primitive.

D.7 IA-DATA.deliver (A-DATA.deliver)

D.7.1 When Invoked

This primitive is invoked when the supporting service is in the ESTABLISHED state and has received an A-DATA.submit.

D.7.2 Action upon Receipt

The contents of the User data parameter are delivered to the supported ASO.

D.8 IA-ALTER-CONTEXT-REQUEST.submit

D.8.1 When Invoked

This primitive may be invoked when the ACPM is in the Awaiting AARE (STA1) or Associated (STA5) state and the supporting service is in the ASSOCIATION PENDING state or the ESTABLISHED state and it wishes to modify the ASO-context or the Presentation context of the supporting service.

D.8.2 Action upon Receipt

An A-ALTER-CONTEXT-REQUEST.submit primitive is invoked using the parameters of the IA-ALTER-CONTEXT-REQUEST.submit primitive.

D.9 IA-ALTER-CONTEXT-REQUEST.deliver (A-ALTER-CONTEXT-REQUEST.deliver)

D.9.1 When Invoked

This primitive is invoked when an A-ALTER-CONTEXT-REQUEST.deliver is received and the supporting service is in the ESTABLISHED state to notify the using ACSE that there has been a request to change the ASO-context or P-context of the supporting service.

⁶⁾ This would frequently be an AARE, but might be another APDU if the supported association is already established.