INTERNATIONAL STANDARD

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Information technology — Open Systems Interconnection — Protocol for the Commitment, Concurrency and Recovery service element: Protocol Implementation Conformance Statement (PICS) proforma

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Protocole pour l'élément de service d'engagement, de concurrence et de reprise: Formulaire de déclaration de conformité de mise en œuvre du protocole (PICS)



Reference number
ISO/IEC 9805-2:1996(E)

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Foreword

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

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

International Standard ISO/IEC 9805-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open Systems Interconnection, data management and open distributed processing,* in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.853.

ISO/IEC 9805 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Protocol for the Commitment, Concurrency and Recovery service element*:

— *Part 1: Protocol specification*

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

Annex A forms an integral part of this part of ISO/IEC 9805.

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Introduction

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

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

a) from different manufacturers;

b) under different managements;

c) of different levels of complexity; and

d) of different technologies.

The Recommendations | International Standards for the application-service-element for Commitment Concurrency, and Recovery (CCR) are:

- ITU-T Rec. X.851 | ISO/IEC 9804, CCR service definition;
- ITU-T Rec. X.852 | ISO/IEC 9805-1, CCR protocol specification;
- ITU-T Rec. X.853 | ISO/IEC 9805-2, CCR Protocol Implementation Conformance Statement (PICS) proforma.

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given OSI protocol. Such a statement is called a Protocol Implementation Conformance Statement.

The PICS proforma, Annex A, has been designed to be a self contained section of this Recommendation | International Standard for use in testing and procurement.

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – PROTOCOL FOR THE COMMITMENT, CONCURRENCY AND RECOVERY SERVICE ELEMENT: PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) PROFORMA

1 Scope

This Recommendation | International Standard defines a Protocol Implementation Conformance Statement (PICS) proforma for the detailed expression of the conformance requirements of ITU-T Rec. X.852 | ISO/IEC 9805-1. This PICS proforma is in compliance with the relevant requirements for a PICS proforma given in ITU-T Rec. X.296 | ISO/IEC 9646-7. Detail of the use of this proforma is provided in this Recommendation | International Standard. Implementors of implementations claiming conformance to ITU-T Rec. X.852 | ISO/IEC 9805-1 shall complete the proforma as part of the conformance requirements. The level of detail required in the proforma exceeds that of the protocol specification by requiring details to uniquely identify the implementation and the supplier.

NOTE – PICS are related to base standards and only base standards. PICS structure might be expanded and refined for other documents (e.g. ISPs) using the base standards (e.g. ISPICS).

2 Normative references

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

2.1 Identical Recommendation | 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.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services.*
- ITU-T Recommendation X.215 (1995) | ISO/IEC 8326:1996, *Information technology – Open Systems Interconnection – Session service definition.*
- ITU-T Recommendation X.216 (1994) | ISO/IEC 8822:1994, *Information technology – Open Systems Interconnection – Presentation service definition.*
- ITU-T Recommendation X.225 (1995) | ISO/IEC 8327-1:1996, *Information technology – Open Systems Interconnection – Connection-oriented session protocol: Protocol specification.*
- 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.247 (1994) | ISO/IEC 8650-2:1995, *Information technology – Open Systems Interconnection – Protocol specification for the Association Control Service Element: Protocol Implementation Conformance Statement (PICS) proforma.*

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- ITU-T Recommendation X.851 (1993) | ISO/IEC 9804:1994, *Information technology – Open Systems Interconnection – Service definition for the commitment, concurrency and recovery service element.*
- ITU-T Recommendation X.852 (1993) | ISO/IEC 9805-1:1994, *Information technology – Open Systems Interconnection – Protocol for the commitment, concurrency and recovery service element: Protocol specification.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.208 (1988), *Specification of Abstract Syntax Notation One (ASN.1).*

  ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1).*
- CCITT Recommendation X.217 (1992), *Service definition for the Association Control Service Element.*

  ISO 8649:1988, *Information processing systems – Open Systems Interconnection – Service definition for the Association Control Service Element.*
- CCITT Recommendation X.227 (1992), *Connection-oriented protocol specification for the Association Control Service Element.*

  ISO 8650:1988, *Information processing systems – Open Systems Interconnection – Protocol specification for the Association Control Service Element.*
- ITU-T Recommendation X.290 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – General concepts.*

  ISO/IEC 9646-1:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts.*
- CCITT Recommendation X.291 (1992), *OSI Conformance testing methodology and framework for protocol Recommendations for CCITT applications – Abstract test suite specification.*

  ISO/IEC 9646-2:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract Test Suite specification.*
- ITU-T Recommendation X.296 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statements.*

  ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements.*

3 Definitions

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

3.1 Terms defined in ITU-T Rec. X.852 | ISO/IEC 9805-1.

3.2 The following terms are defined in ITU-T Rec. X.290 | ISO/IEC 9646-1:

a) Protocol Implementation Conformance Statement (PICS);

b) PICS proforma.

4 Abbreviations

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

FU	Function Unit
ISP	International Standardized Profile
ISPICS	ISP Implementation Conformance Statement
PICS	Protocol Implementation Conformance Statement
Rcv	Receiver
Sdr	Sender

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5 Conformance

A conforming PICS shall be technically equivalent to the PICS proforma given in Annex A and shall preserve the numbering and ordering of items in Annex A.

A PICS which conforms to this Recommendation | International Standard shall:

a) describe an implementation which conforms to ITU-T Rec. X.852 | ISO/IEC 9805-1;

b) be a conforming PICS proforma, which has been completed in accordance with the instructions for completion given in A.1 and A.3; and

c) include the information necessary to uniquely identify both the supplier and the implementation.

6 System conformance statement

This PICS shall be referenced by a System Conformance Statement, which shall include directly, or by reference, questions which relate to the following:

a) Which of the CCR atomic-action roles are implemented:

- Master,
- Intermediate,
- Leaf?

b) In the absence of heuristic decision, are all the CCR service-user rules (in Annex A of ITU-T Rec. X.851 | ISO/IEC 9804) enforced?

c) Following a heuristic decision, which of the service user rules identified in A.1.2 of ITU-T Rec. X.851 | ISO/IEC 9804 are enforced?

d) What observable event, if any, corresponds to the issue of a CCR primitive?

NOTE – This will often be the transmission of a CCR APDU in a CCR abstract syntax, but different answers apply where CMS is used, or where the implementation under test has a defined lower boundary.

In addition, where the referencing specification determines whether an optional element of the CCR protocol is implemented, the PICS of a referencing specification shall state which response shall be made for that element in this CCR PICS.

NOTE – For example, if the referencing specification makes use of the user-data parameter of a CCR primitive, the referencing specification ICS shall state that support for this parameter is mandatory.

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Annex A

Protocol Implementation Conformance Statement (PICS) proforma for Commitment, Concurrency, and Recovery (CCR)[1)]

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

A.1 Description of the proforma

This proforma is divided into the following sections:

a) Description of the proforma;

b) Implementation detail;

c) General ITU-T Rec. X.852 | ISO/IEC 9805-1 detail; and

d) CCR protocol detail.

Throughout each section, whenever a line contains a requirement for an implementation response, that line is identified by a reference number. For the significance of this numbering, see A.2.

A.1.1 Implementation detail

The implementation detail provides a number of items of information which allow a unique identification of an implementation and the supplier. These are implementor and supplier specific.

A.1.2 General ITU-T Rec. X.852 | ISO/IEC 9805-1 detail

The general detail clause covers general details of ITU-T Rec. X.852 | ISO/IEC 9805-1. This includes information on which protocol version numbers, technical corrigenda and amendments have been included in the implementation. Also specified in this section is a statement of which roles have been implemented.

A.1.3 CCR protocol detail

Comprising the major portion of the PICS, the CCR Protocol Detail section establishes which field of which APDUs is implemented. It requires a statement of the range of values supported for sending and receiving each particular parameter, and a reference to further detail for many of the fields.

A.1.4 Multi-layer dependencies

This section requires a statement of the support for the dependencies indicated in ITU-T Rec. X.852 | ISO/IEC 9805-1.

A.2 Notations defined for the proforma

In order to reduce the size of the tables in the PICS proforma, notations have been introduced. These have allowed the use of multi-column layout where the columns are PICS No., Item or APDU or Parameter name, Reference (to relevant clause of ITU-T Rec. X.852 | ISO/IEC 9805-1), Status, Support, Cross Reference (to another table in this Recommendation | International Standard – if any), VALUES, and Comment. Some of these columns are subdivided to indicate separately the status or support as Sender ("Sdr") or Receiver ("Rcv"). The definition of each of these follows.

A.2.1 PICS number column

This column contains a serial number that increases monotonically down the table to enable reference to that row of the table (refer to A.2).

A.2.2 Item column

This column contains an identification of the item, APDU or parameter addressed by this row in the table.

1) Copyright release for PICS proforma: Users of this Recommendation | International Standard may freely reproduce the PICS proforma in this annex so that it can be used for its intended purpose and may further publish the completed PICS.

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A.2.3 Reference column

This column contains a reference to a clause in ITU-T Rec. X.852 | ISO/IEC 9805-1 that specifies the item addressed in this row of table.

A.2.4 Status column

Status – Defined in ITU-T Rec. X.852 | ISO/IEC 9805-1. This column indicates the level of support required for conformance to ITU-T Rec. X.852 | ISO/IEC 9805-1. These are defined below:

'm' Mandatory support is required for conformance to ITU-T Rec. X.852 | ISO/IEC 9805-1.

'd' Mandatory support is required for conformance to ITU-T Rec. X.852 | ISO/IEC 9805-1. A default value is defined in the ASN.1 specification and for this special value a sender may omit this parameter when this value is intended. A receiver shall interpret the omission of an explicit value for this parameter as implying this default value.

'o' Optional support is permitted for conformance to ITU-T Rec. X.852 | ISO/9805-1. Although if implemented, it must conform to the specifications and restrictions contained ITU-T Rec. X.852 | ISO/IEC 9805-1. These restrictions may affect the optionality of other parameters.

'o.n' The notation o.<n> signifies that at least one out of the n group shall be implemented (where <n> is a positive integer).

'cn' Conditional support as indicated by the predicate expression for cn (where <n> is a positive integer).

'n/a' Indicates that the item is not applicable.

The column is subdivided into Sender (Sdr) and Receiver (Rcv) roles.

A.2.5 Support column

The "Support" column shall be completed by the supplier or implementor to indicate the level of implementation of each feature in the role of Sender and Receiver. Where a column is preprinted with n/a, representing a non-applicable entry, no entry shall be inserted at that position. Elsewhere entries shall be as defined in A.2.9.

A.2.6 Cross reference column

This column contains a cross reference to another table in this Recommendation | International Standard where the item addressed by this row of this table is addressed in more detail. If there is no such expansion table, then this is indicated by the entry "n/a".

A.2.7 VALUES column

This column is subdivided into "Status", which indicates the allowed values specified in ITU-T Rec. X.852 | ISO/IEC 9805-1, and "support", which shall be completed by the supplier or the implementor to indicate any restriction on the values supported by the implementation of each feature in the role of Sender or Receiver. Where this column is preprinted with n/a, representing a non-applicable entry, no entry shall be inserted at that position. An entry of "any" in the status column indicates that no limitations on the value are specified in Part 1 of ISO/IEC 9805. Elsewhere entries shall be as defined in A.2.9.

The ASN.1 value notation is used to express allowed and implemented values of parameters in the VALUES column.

A.2.8 Column entries

This column may be preprinted with an explanatory comment, or left blank for the implementator to add a comment on the responses given, or other relevant information. If the implementator has no comment to add, then a "–" or "n/a" should be entered.

A.2.9 Column entries

The PICS proforma has been designed such that the only entries required in the "Sender" and "Receiver" columns are:

"Y" Yes, the feature has been implemented. If "Y" is entered in a PICS table, the value of that entry when referenced in Boolean expressions is "TRUE".

"N" No, the feature has not been implemented (sender only). If "N" is entered in a PICS table, the value of that entry when referenced in Boolean expressions is "FALSE".

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"Ig" Ignored, receipt of the item is not treated as a protocol error, but is ignored rather than processed. If "Ig" is entered in a PICS table, the value of that entry when referenced in Boolean expressions is "FALSE".

"Err" Error, receipt of this item is treated as a protocol error. If "Err" is entered in a PICS table, the value of that entry when referenced in Boolean expressions is "FALSE".

"Ig" and "Err" shall only be used in the "Receiver" columns. They have the same static conformance semantic as "N". If an item is marked as "m" or "d" in the status column, then only "Y" may be checked in the support column for the implementation to be conformant.

Where a cell has been preprinted with one of more of these entries followed by [ ], the [ ] box should be checked if that answer applies. If no preprinted answer applies, a separate response should be supplied in the white space of the cell. Such an alternative response is an indication of non-conformance.

The "VALUES" column requires the specification of the range of values implemented for the feature it is alongside, for each role, where relevant. The range of values implemented may be specified in terms of the values of the ASN.1 datatype, or in terms of the encoded length.

A.3 PICS numbers

Each line, within a clause of the PICS proforma, which requires implementation detail to be entered, is numbered in the left hand box of the line. This numbering is included as means of uniquely identifying all possible implementation detail within the PICS proforma. The need for such unique referencing has been identified by the testing bodies.

All responses shall be referenced by specifying the following sequence:

a) the clause number;

b) a solidus character (/);

c) line number;

d) line item identifier as defined in CCITT Rec. X.291 | ISO/IEC 9646-2.

A.4 Completion of the PICS

The implementor shall complete all entries in the columns marked "Support", and VALUES (Support subdivisions)". In addition, other specifically identified information shall be provided by the implementor where requested. No changes shall be made to the proforma except the completion as required. Recognizing that the level of detail required may, in some instances, exceed the space available for responses, a number of responses specifically allow for the addition of appendices to the PICS.

A.5 Date of Statement

Specify the date on which the PICS has been filled in (see Table A.1).

Table A.1 – Date of Statement

1	Date of Statement (yy-mm-dd)	

A.6 Implementation Details

Specify the information necessary to uniquely identify the implementation and the systems in which it may reside. This may include details of:

a) supplier, implementor name, operating system, suitable hardware;

b) system supplier and/or client of the test laboratory that is to test the implementation;

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c) information on whom to contact if there are queries concerning the content of this PICS;

d) the relationship between this PICS and the System Conformance Statement for the system (see Note).

NOTE – The System Conformance Statement is defined in ITU-T Rec. X.290 | ISO/IEC 9646-1. It relates to a PICS covering more than one layer of the Reference Model.

Table A.2 – Implementation Details

1	

A.7 ITU-T Rec. X.852 | ISO/IEC 9805-1

A PICS is completed in order to check conformance to a particular version of a protocol. This particular CCR PICS proforma relates to implementations of both CCR protocol Version 1 and CCR protocol Version 2. Both these versions are specified in ITU-T Rec. X.852 (1993) | ISO/IEC 9805-1:1994.

Table A.3 identifies the version or versions of the CCR protocol to which the completed PICS applies.

Table A.3 – Protocol versions implemented

	Version number(s)	Support	Mnemonic	Comment
1	Version 1		VERSION1	
2	Version 2		VERSION2	

A.8 Amendments and Technical Corrigenda implemented

Specify the Amendments and Technical Corrigenda number(s) implemented for the Recommendation | International Standard. If no Amendments or Technical Corrigenda are supported by the implementation, the answer shall be "NONE" (see Table A.4).

Table A.4 – Amendments and Technical Corrigenda implemented

1	

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A.9 Global Statement of Conformance

A.9.1 Mandatory features implemented

See Table A.5.

Table A.5 – Mandatory features implemented

1	Are all mandatory features of ITU-T Rec. X.852 | ISO/IEC 9805-1 implemented? Yes or No	
NOTE – If a positive response is not given to this box, then the implementation does not conform to ITU-T Rec. X.852 | ISO/IEC 9805-1.		

A.10 General Capabilities

A.10.1 For Atomic Action Branch Establishment

Does the implementation support the establishment of Atomic Action Branches as (see Table A.6):

NOTE – If the support for A.10.1 and A.10.2 is "N", the CCR service-user will always be the master of the atomic action.

Table A.6 – For Atomic Action Branch Establishment

	Roles	Status	Support (Y/N)	Mnemonic	Comment
1	Superior	o.1		SUPER	
2	Subordinate	o.1		SUBORD	
o.1: at least one of the Superior or Subordinate roles shall be supported.					

A.10.2 Support for optional services

See Table A.7.

Table A.7 – Support for optional services

	Roles	Status	Support (Y/N)	Mnemonic	Comment
1	Sending begin response	c11		SENDBGNRC	
2	Receiving begin confirmation	c10		RCVBGNRC	
3	Sending prepare	c10		SENDPREP	
4	Receiving prepare	c11		RCVPREP	
c10: if SUPER then o else n/a. c11: if SUBORD then o else n/a.					

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A.10.3 Support for the concatenation mechanism

What is the support for the concatenation mechanism? (See Table A.8.)

Table A.8 – Support for the concatenation mechanism

	Concatenation Group	Reference	Status		Support		Cross reference	Comment
			Sdr	Rcv	Sdr	Rcv		
1	UASE/ C-BEGIN-RI/ UASE/ C-PREPARE-RI	11.2	o	m		Y[ ]	n/a	
2	UASE/ C-BEGIN-RC/ UASE/ C-READY-RI	11.2	o	m		Y[ ]	n/a	
3	UASE/ C-PREPARE-RI	11.2	o	m		Y[ ]	n/a	
4	UASE/ C-READY-RI	11.2	o	m		Y[ ]	n/a	
5	C-COMMIT-RI/ C-BEGIN-RI	11.2	o	m		Y[ ]	n/a	
6	C-COMMIT-RC/ C-BEGIN-RC/ UASE/ C-READY-RI	11.2	o	m		Y[ ]	n/a	
7	C-ROLLBACK-RI/ C-BEGIN-RI	11.2	o	m		Y[ ]	n/a	
8	C-ROLLBACK-RC/ C-BEGIN-RI	11.2	o	m		Y[ ]	n/a	
9	C-ROLLBACK-RC/ C-BEGIN-RC	11.2	c12	m		Y[ ]	n/a	
c12: if A.10.3/7 then o else n/a.								

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A.10.4 Other Implementation Characteristics

State the characteristics of the implementation (see Table A.9).

Table A.9 – Other Implementation Characteristics

	Characteristic	Reference	Status	Support (Y/N)	Cross reference	VALUES		Comment
						Status	Support	
1	Is atomic action data visible to human management?	13.1 c)	o			n/a	n/a	
2	Is provision made for local management to delete atomic action data?	13.1 d)	o			n/a	n/a	
3	Is atomic action data automatically deleted after some number (N) of recovery attempts at least time T1 apart?	13.4.2 a)	o			n/a	n/a	
4	Is there a fixed value for N?	13.1 e)	c1			any		
5	Is there a fixed value for T1?	13.1 e)	c1			any		
c1: if A.10.4/3 then o else n/a.								

Table A.10 – Recovery from system failure

	Characteristic	Reference	Support (Y/N)	Comment
1	Which types of system failure can be recovered from (while maintaining atomic action data)?	13.1 f)		

A.11 CCR Protocol – General

In the remaining clauses detail the level of support for the CCR protocol and its APDU fields. State which fields are, and which are not, implemented in each APDU.

If an APDU field is implemented, then its range of values shall be specified. Fields not implemented shall be so marked.

NOTES

1 In order to keep the protocol tables compact, some forward references have been introduced to clauses which expand upon the detail of field support.

2 The CCR protocol requires a number of optional services, or parameters, to be available (e.g. Application Entity Titles in ACSE). This requirement is outside the scope of this PICS proforma.

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A.12 CCR Protocol

A.12.1 CCR APDUs

See Table A.11.

Table A.11 – CCR APDUs

	CCR APDU Name	Reference	Status		Support		Cross reference	Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		
1	C-INITIALIZE-RI	7.1.3.2	c13	c13			A.12.2	
2	C-INITIALIZE-RC	7.1.3.4	c13	c13			A.12.3	
3	C-BEGIN-RI	7.2.4.2	c2	c3			A.12.4	
4	C-BEGIN-RC	7.2.4.4	c14	c15			A.12.5	
5	C-PREPARE-RI	7.3.4.2	c16	c17			A.12.6	
6	C-READY-RI	7.4.4.2	c3	c2			A.12.7	
7	C-COMMIT-RI	7.5.4.2	c2	c3			A.12.8	
8	C-COMMIT-RC	7.5.4.4	c3	c2			A.12.9	
9	C-ROLLBACK-RI	7.6.4.2	m	m	Y[ ]	Y[ ]	A.12.10	
10	C-ROLLBACK-RC	7.6.4.4	m	m	Y[ ]	Y[ ]	A.12.11	
11	C-RECOVER-RI	7.7.4.2	m	m	Y[ ]	Y[ ]	A.12.12	
12	C-RECOVER-RC	7.7.4.4	m	m	Y[ ]	Y[ ]	A.12.13	

c2: if SUPER then m else n/a.
c3: if SUBORD then m else n/a.
c13: if VERSION2 then m else n/a.
c14: if SENDBGNRC then m else n/a.
c15: if RCVBGNRC then m else n/a.
c16: if SENDPREP then m else n/a.
c17: if RCVPREP then m else n/a.

A.12.2 C-INITIALIZE-RI APDU

See Table A.12.

Table A.12 – C-INITIALIZE-RI APDU

	C-INITIALIZE-RI Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	version-number	7.1.2	c13	c13	Y[ ]	Y[ ]	n/a				

c13: if VERSION2 then m else n/a.

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A.12.3 C-INITIALIZE-RC APDU

See Table A.13.

Table A.13 – C-INITIALIZE-RC APDU

	C-INITIALIZE-RC Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	version-number	7.1.2	c13	c13	Y[ ]	Y[ ]	n/a				
c13: if VERSION2 then m else n/a.											

A.12.4 C-BEGIN-RI APDU

See Table A.14.

Table A.14 – C-BEGIN-RI APDU

	C-BEGIN-RI Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	atomic-action-identifier	7.2.5	m	m	Y[ ]	Y[ ]	A.9.2.1	n/a	n/a	n/a	
2	branch-suffix OCTET STRING INTEGER	7.2.5	 o.2 o.2	 m m		 Y[ ] Y[ ]	n/a	 any any			
3	User-data	7.2.5	o	o		Y[ ] Ig[ ]	n/a	any			
o.2: At least one of the OCTET STRING or INTEGER forms shall be supported. That is, at least one answer shall be "Y".											

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A.12.4.1 Detail of atomic-action identifier field of C-BEGIN-RI APDU

See Table A.15.

Table A.15 – Detail of atomic-action identifier field of C-BEGIN-RI APDU

	C-BEGIN-RI "atomic-action-identifier" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
	masters-name	7.2.5									
1	AE-title-form1 (Name)		c4	m		Y[ ]	n/a	any[a)]			
2	AE-title-form2 (OBJECT IDENTIFIER)		c4	m		Y[ ]	n/a	any[a)]			
3	side		c4a	c4b			A.12.4.1.1	n/a			
	atomic-action-suffix	7.2.5									
4	OCTET STRING		c5	m		Y[ ]	n/a	any			
5	INTEGER		c5	m		Y[ ]	n/a	any			

a) Reference should also be made to the Protocol Implementation Conformance Statement for Association Control (ISO/IEC 8650-2:1995).

c4: if SUBORD then m else if VERSION1 then o.3 else o.3a.
c4a: if VERSION2 then { if SUBORD or VERSION1 then o else o.3a } else n/a.
c4b: if VERSION2 then m else n/a.
c5: if SUBORD then o.4 else m.
o.3: At least one of AE-title-form1 or AE-title-form2 shall be supported.
o.3a: At least one of AE-title-form1 or AE-title-form2 or the side form shall be supported.
o.4: At least one of OCTET STRING or INTEGER shall be supported.

A.12.4.1.1 Side form of atomic-action-identifier field of C-BEGIN-RI APDU

See Table A.16.

Table A.16 – Side form of atomic-action-identifier field of C-BEGIN-RI APDU (This table only applies if VERSION2)

	C-BEGIN-RI "atomic-action-identifier" sub-field masters-name side values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	Sender	7.2.5	c5a	m			
2	Receiver	7.2.5	o	m			

c5a: if A.12.4.1/1.sdr or A.12.4.1/2.sdr then o else m.

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A.12.5 C-BEGIN-RC APDU

See Table A.17.

Table A.17 – C-BEGIN-RC APDU

	C-BEGIN-RC Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.2.6	o	o		Y[ ] Ig[ ]	n/a	any			

A.12.6 C-PREPARE-RI APDU

See Table A.18.

Table A.18 – C-PREPARE-RI APDU

	C-PREPARE-RI Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.3.5	o	o		Y[ ] Ig[ ]	n/a	any			

A.12.7 C-READY-RI APDU

See Table A.19.

Table A.19 – C-READY-RI APDU

	C-READY-RI Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.4.5	o	o		Y[ ] Ig[ ]	n/a	any			

A.12.8 C-COMMIT-RI APDU

See Table A.20.

Table A.20 – C-COMMIT-RI APDU

	C-COMMIT-RI Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.5.5	o	o		Y[ ] Ig[ ]	n/a	any			

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A.12.9 C-COMMIT-RC APDU

See Table A.21.

Table A.21 – C-COMMIT-RC APDU

	C-COMMIT-RC Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.5.6	o	o		Y[ ] Ig[ ]	n/a	any			

A.12.10 C-ROLLBACK-RI APDU

See Table A.22.

Table A.22 – C-ROLLBACK-RI APDU

	C-ROLLBACK-RI Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.6.5	o	o		Y[ ] Ig[ ]	n/a	any			

A.12.11 C-ROLLBACK-RC APDU

See Table A.23.

Table A.23 – C-ROLLBACK-RC APDU

	C-ROLLBACK-RC Field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	User-data	7.6.6	o	o		Y[ ] Ig[ ]	n/a	any			

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A.12.12 C-RECOVER-RI APDU

See Table A.24.

Table A.24 – C-RECOVER-RI APDU

	C-RECOVER-RI Field Name	Refer-ence	Status		Support		Predicate	Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv			Status	Support		
										Sdr	Rcv	
1	atomic-action-identifier	7.7.5	m	m	Y[ ]	Y[ ]		A.12.12.1	n/a	n/a	n/a	
2	branch-identifier	7.7.5	m	m	Y[ ]	Y[ ]		A.12.12.2	n/a	n/a	n/a	
3	recovery-state	7.7.5	m	m	Y[ ]	Y[ ]	VERSION1	A.12.12.3	n/a	n/a	n/a	
							VERSION2	A.12.12.4	n/a	n/a	n/a	
4	User-data	7.7.5	o	o		Y[ ] Ig[ ]		n/a	any			

A.12.12.1 Detail of atomic-action-identifier field of C-RECOVER-RI APDU

See Table A.25.

Table A.25 – Detail of atomic-action-identifier field of C-RECOVER-RI APDU

	C-RECOVER-RI "atomic-action-identifier" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
	masters-name	7.7.5									
1	AE-title-form1 (Name)		c4	c4	Y[ ]	Y[ ]	n/a	any[a)]			
2	AE-title-form2 (OBJECT IDENTIFIER)		c4	c4	Y[ ]	Y[ ]	n/a	any[a)]			
3	side		c4a	c4a			A.12.12.1.1	n/a			
	atomic-action-suffix	7.7.5									
4	OCTET STRING		c5	c5	Y[ ]	Y[ ]	n/a	any			
5	INTEGER		c5	c5	Y[ ]	Y[ ]	n/a	any			

a) Reference should also be made to the Protocol Implementation Conformance Statement for Association Control (ISO/IEC 8650-2:1995).

c4: if SUBORD then m else if VERSION1 then o.3 else o.3a.
c4a: if VERSION2 then { if SUBORD or VERSION1 then o else o.3a } else n/a.
c5: if SUBORD then o.4 else m.
o.3: At least one of AE-title-form1 or AE-title-form2 shall be supported.
o.3a: At least one of AE-title-form1 or AE-title-form2 or the side form shall be supported.
o.4: At least one of OCTET STRING or INTEGER shall be supported.

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A.12.12.1.1 Side form of atomic-action-identifier field of C-RECOVER-RI APDU

See Table A.26.

Table A.26 – Side form of atomic-action-identifier field of C-RECOVER-RI APDU (This table only applies if VERSION2)

	C-RECOVER-RI "atomic-action-identifier" sub-field masters-name side values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	Sender	7.7.5	c5b	c5c			
2	Receiver	7.7.5	c5b	c5c			
c5b: if A.12.12.1/1.sdr or A.12.12.1/2.sdr then o else m. c5c: if A.12.12.1/1.rcv or A.12.12.1/2.rcv then o else m.							

A.12.12.2 Detail of branch-identifier field of C-RECOVER-RI APDU

See Table A.27.

Table A.27 – Detail of branch-identifier field of C-RECOVER-RI APDU

	C-RECOVER-RI "branch-identifier" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
	masters-name	7.7.5									
1	AE-title-form1 (Name)		c6	c6	Y[ ]	Y[ ]	n/a	any[a)]			
2	AE-title-form2 (OBJECT IDENTIFIER)		c6	c6	Y[ ]	Y[ ]	n/a	any[a)]			
3	side		c6a	c6a			A.12.12.2.1	n/a			
	branch-suffix	7.7.5									
4	OCTET STRING		c7	c7			n/a	any			
5	INTEGER		c7	c7			n/a	any			
a) Reference should also be made to the Protocol Implementation Conformance Statement for Association Control (ISO/IEC 8650-2:1995). c6: if SUPER then { if VERSION1 then o.5 else o.5a } else m. c6a: if VERSION2 then { if SUPER and not VERSION1 then o.5a else o } else n/a. c7: if SUPER then o.6 else m. o.5: At least one of AE-title-form1 and AE-title-form2 shall be supported. o.5a: At least one of AE-title-form1 and AE-title-form2 and the side form shall be supported. o.6: At least one of OCTET STRING and INTEGER shall be supported.											

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A.12.12.2.1 Side form of branch-identifier-field of C-RECOVER-RI APDU

See Table A.28.

Table A.28 – Side form of branch-identifier field of C-RECOVER-RI APDU (This table only applies if VERSION2)

	C-RECOVER-RI "branch-identifier" sub-field masters-name side values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	Sender	7.7.5	c6b	c6c			
2	Receiver	7.7.5	c6b	c6c			
c6b: if A.12.12.2/1.sdr or A.12.12.2/2.sdr then o else m. c6c: if A.12.12.2/1.rcv or A.12.12.2/2.rcv then o else m.							

A.12.12.3 Detail of recovery-state field of C-RECOVER-RI APDU

See Table A.29.

Table A.29 – Detail of recovery-state field of C-RECOVER-RI APDU (This table only applies if VERSION1)

	C-RECOVER-RI "recovery-state" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	commit	7.7.5	c2	c3		Y[ ]	n/a				
2	ready	7.7.5	c3	c2		Y[ ]	n/a				
c2: if SUPER then m else n/a. c3: if SUBORD then m else n/a.											

A.12.12.4 Detail of recovery-state field of C-RECOVER-RI APDU

See Table A.30.

Table A.30 – Detail of recovery-state field of C-RECOVER-RI APDU (This table only applies if VERSION2)

	C-RECOVER-RI recovery-state values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	0	7.6.5	c2	c3			
2	1	7.6.5	c3	c2			
c2: if SUPER then m else n/a. c3: if SUBORD then m else n/a.							

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A.12.13 C-RECOVER-RC APDU

See Table A.31.

Table A.31 – C-RECOVER-RC APDU

	C-RECOVER-RC Field Name	Reference	Status		Support		Predicate	Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv			Status	Support		
										Sdr	Rcv	
1	atomic-action-identifier	7.7.6	m	m	Y[ ]	Y[ ]		A.12.13.1	n/a	n/a	n/a	
2	branch-identifier	7.7.6	m	m	Y[ ]	Y[ ]		A.12.13.2	n/a	n/a	n/a	
3	recovery-state	7.7.6	m	m	Y[ ]	Y[ ]	VERSION1	A.12.13.3	n/a	n/a	n/a	
							VERSION2	A.12.13.4	n/a	n/a	n/a	
4	User-data	7.7.6	o	m		Y[ ] Ig[ ]		n/a	any			

A.12.13.1 Detail of atomic-action-identifier field of C-RECOVER-RC APDU

See Table A.32.

Table A.32 – Detail of atomic-action-identifier field of C-RECOVER-RC APDU

	C-RECOVER-RC "atomic-action-identifier" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
	masters-name	7.7.6									
1	AE-title-form1 (Name)		c4	c4	Y[ ]	Y[ ]	n/a	any[a]			
2	AE-title-form2 (OBJECT IDENTIFIER)		c4	c4	Y[ ]	Y[ ]	n/a	any[a]			
3	side		c4a	c4a			A.12.13.1.1	n/a			
	atomic-action-suffix	7.7.6									
4	OCTET STRING		c5	c5	Y[ ]	Y[ ]	n/a	any			
5	INTEGER		c5	c5	Y[ ]	Y[ ]	n/a	any			

[a] Reference should also be made to the Protocol Implementation Conformance Statement for Association Control (ISO/IEC 8650-2:1995).

c4: if SUBORD then m else if VERSION1 then o.3 else o.3a.
c4a: if VERSION2 then { if SUBORD or VERSION1 then o else o.3a } else n/a.
c5: if SUBORD then o.4 else m.
o.3: At least one of AE-title-form1 or AE-title-form2 shall be supported.
o.3a: At least one of AE-title-form1 or AE-title-form2 or the side form shall be supported.
o.4: At least one of OCTET STRING or INTEGER shall be supported.

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A.12.13.1.1 Side form of atomic-action-identifier field of C-RECOVER-RC APDU

See Table A.33.

Table A.33 – Side form of atomic-action-identifier field of C-RECOVER-RC APDU (This table only applies if VERSION2)

	C-RECOVER-RC "atomic-action-identifier" sub-field masters-name side values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	Sender	7.7.6	c5d	c5e			
2	Receiver	7.7.6	c5d	c5e			
c5d: if A.12.13.1/1.sdr or A.12.13.1/2.sdr then o else m. c5e: if A.12.13.1/1.rcv or A.12.13.1/2.rcv then o else m.							

A.12.13.2 Detail of branch-identifier field of C-RECOVER-RC APDU

See Table A.34.

Table A.34 – Detail of branch-identifier field of C-RECOVER-RC APDU

	C-RECOVER-RC "branch-identifier" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
	masters-name	7.7.6									
1	AE-title-form1 (Name)		c6	c6	Y[ ]	Y[ ]	n/a	any[a)]			
2	AE-title-form2 (OBJECT IDENTIFIER)		c6	c6	Y[ ]	Y[ ]	n/a	any[a)]			
3	side		c6a	c6a			A.12.13.2.1	n/a			
	branch-suffix	7.7.6									
4	OCTET STRING		c7	c7			n/a	any			
5	INTEGER		c7	c7			n/a	any			
a) Reference should also be made to the Protocol Implementation Conformance Statement for Association Control (ISO/IEC 8650-2:1995). c6: if SUPER then { if VERSION1 then o.5 else o.5a } else m. c6a: if VERSION2 then { if SUPER and not VERSION1 then o.5a else o } else n/a. c7: if SUPER then o.6 else m. o.5: At least one of AE-title-form1 and AE-title-form2 shall be supported. o.5a: At least one of AE-title-form1 and AE-title-form2 and the side form shall be supported. o.6: At least one of OCTET STRING and INTEGER shall be supported.											

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A.12.13.2.1 Side form of branch-identifier field of C-RECOVER-RC APDU

See Table A.35.

Table A.35 – Side form of branch-identifier field of C-RECOVER-RC APDU (This table only applies if VERSION2)

	C-RECOVER-RC "branch-identifier" sub-field masters-name side values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	Sender	7.7.6	c6d	c6e			
2	Receiver	7.7.6	c6d	c6e			
c6d: if A.12.13.2/1.sdr or A.12.13.2/2.sdr then o else m. c6e: if A.12.13.2/1.rcv or A.12.13.2/2.rcv then o else m.							

A.12.13.3 Detail of recovery-state field of C-RECOVER-RC APDU

See Table A.36.

Table A.36 – Detail of recovery-state field of C-RECOVER-RC APDU (This table only applies if VERSION1)

	C-RECOVER-RI "recovery-state" sub-field Name	Reference	Status		Support		Cross reference	VALUES			Comment
			Sdr	Rcv	(Y/N) Sdr	(Y/Ig/Err) Rcv		Status	Support		
									Sdr	Rcv	
1	done	7.7.6	c3	c2	Y[ ]	Y[ ]	n/a				
2	unknown	7.7.6	c2	c3	Y[ ]	Y[ ]	n/a				
3	retry-later	7.7.6	m	m	Y[ ]	Y[ ]	n/a				
c2: if SUPER then m else n/a. c3: if SUBORD then m else n/a.											

A.12.13.4 Detail of recovery-state field of C-RECOVER-RC APDU

See Table A.37.

Table A.37 – Detail of recovery-state field of C-RECOVER-RC APDU (This table only applies if VERSION2)

	C-RECOVER-RC recovery-state values	Reference	Status		Support		Comment
			Sdr	Rcv	Sdr	Rcv	
1	2	7.7.6	c3	c2			
2	3	7.7.6	c2	c3			
3	5	7.7.6	m	m			
c2: if SUPER then m else n/a. c3: if SUBORD then m else n/a.							

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A.13 Multi-layer Dependencies

State the support for the dependencies indicated in ITU-T Rec. X.852 | ISO/IEC 9805-1 and add comments as appropriate to the implementation (see Table A.38).

Table A.38 – Multi-layer Dependencies

	Dependency	Reference	Status (Y/N)	Support	Comment
1	ACSE (X.227 | ISO 8650:1988)	6.2	m	Y[ ]	
2	Presentation – Kernel [ITU-T Rec. X.226 (1994) | ISO 8823-1:1994]	6.3	c9	Y[ ]	
3	Session Protocol V.2 and/or subsequent – Kernel, Typed Data, Minor Synch and Resynch FUs [ITU-T Rec. X.225 (1994) | ISO/IEC 8327-1:1996] Data Separation	6.4	c8		
4	Session Protocol V.2 and/or subsequent – Kernel, Typed Data, Major Synch, Minor Synch and Resynch FUs [ITU-T Rec. X.225 (1994) | ISO/IEC 8327-1:1996]	6.4	c9		
5	Transport Expedited used	6.4	o[a)]		

a) Note that if the Transport expedited option is used while CCR is active, then the C-ROLLBACK service may cause the loss of data before the start of the atomic action to be rolled back, if ISO/IEC 9805:1990 and NOT ISO/IEC 9805/Amd.2:1992 is used.

c8: if VERSION2 then m else n/a.
c9: if VERSION1 then m else n/a.

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