INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

X.585

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(12/97)

SERIES X: DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

Directory

Information technology – Open Systems Interconnection – The Directory: Protocol Implementation Conformance Statement (PICS) proforma for the Directory operational binding management protocol

ITU-T Recommendation X.585

(Previously CCITT Recommendation)

ITU-T X-SERIES RECOMMENDATIONS

DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

PUBLIC DATA NETWORKS	
Services and facilities	X.1–X.19
Interfaces	X.20–X.49
Transmission, signalling and switching	X.50–X.89
Network aspects	X.90–X.149
Maintenance	X.150–X.179
Administrative arrangements	X.180–X.199
OPEN SYSTEM INTERCONNECTION	
Model and notation	X.200–X.209
Service definitions	X.210–X.219
Connection-mode protocol specifications	X.220–X.229
Connectionless-mode protocol specifications	X.230–X.239
PICS proformas	X.240–X.259
Protocol Identification	X.260–X.269
Security Protocols	X.270–X.279
Layer Managed Objects	X.280–X.289
Conformance testing	X.290–X.299
INTERWORKING BETWEEN NETWORKS	
General	X.300–X.349
Satellite data transmission systems	X.350–X.399
MESSAGE HANDLING SYSTEMS	X.400–X.499
DIRECTORY	**X.500–X.599**
OSI NETWORKING AND SYSTEM ASPECTS	
Networking	X.600–X.629
Efficiency	X.630–X.639
Quality of service	X.640–X.649
Naming, Addressing and Registration	X.650–X.679
Abstract Syntax Notation One (ASN.1)	X.680–X.699
OSI MANAGEMENT	
Systems Management framework and architecture	X.700–X.709
Management Communication Service and Protocol	X.710–X.719
Structure of Management Information	X.720–X.729
Management functions and ODMA functions	X.730–X.799
SECURITY	X.800–X.849
OSI APPLICATIONS	
Commitment, Concurrency and Recovery	X.850–X.859
Transaction processing	X.860–X.879
Remote operations	X.880–X.899
OPEN DISTRIBUTED PROCESSING	X.900–X.999

For further details, please refer to ITU-T List of Recommendations.

INTERNATIONAL STANDARD 13248-3

ITU-T RECOMMENDATION X.585

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – THE DIRECTORY: PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) PROFORMA FOR THE DIRECTORY OPERATIONAL BINDING MANAGEMENT PROTOCOL

Summary

This Recommendation | International Standard provides the PICS proforma for the Directory Operational Binding Management Protocol (DOP) specified in ITU-T Rec. X.500-Series (1993) | ISO/IEC 9594:1995.

The scope of this Recommendation | International Standard is the specification of the conformance statements for a Directory System Agent (DSA).

Source

The ITU-T Recommendation X.585 was approved on the 12th of December 1997. The identical text is also published as ISO/IEC International Standard 13248-3.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Introduction

This Recommendation | International Standard has been produced to facilitate the interconnection of information processing systems to provide directory services. The set of all such systems, together with the directory information which they hold, can be viewed as an integrated whole, called the **Directory**. The information held by the Directory, collectively known as the Directory Information Base (DIB), is typically used to facilitate communication between, with or about objects such as application entities, people, terminals and distribution lists.

The Directory plays a significant role in Open Systems Interconnection, whose aim is to allow, with a minimum of technical agreement outside of the interconnection standards themselves, the interconnection of information processing systems:

- from different manufacturers;
- under different managements;
- of different levels of complexity; and
- of different ages.

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 statement is called a Protocol Implementation Conformance Statement (PICS).

This Recommendation | International Standard provides the Protocol Implementation Conformance Statement (PICS) proforma for the Directory Operational Binding Protocol (DOP) specified in ITU-T Rec. X.500-Series (1993) | ISO/IEC 9594:1995. All references to the Directory Specifications, made throughout this Recommendation | International Standard, are to the second edition of those specifications (ITU-T Rec. X.500-Series (1993) | ISO/IEC 9495:1995).

Annex A specifies the PICS proforma for the Directory Operational Binding Management Protocol as defined in ITU-T Rec. X.500-Series | ISO/IEC 9594.

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – THE DIRECTORY: PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) PROFORMA FOR THE DIRECTORY OPERATIONAL BINDING MANAGEMENT PROTOCOL

1 Scope

This Recommendation | International Standard provides the PICS proforma for the Directory Operational Binding Management Protocol (DOP) specified in ITU-T Rec. X.500-Series (1993) | ISO/IEC 9594:1995. This PICS proforma is in compliance with the relevant requirements, and in accordance with the relevant guidance for PICS proforma, given in ITU-T Rec. X.296 | ISO/IEC 9646-7.

The supplier of a DOP implementation that is claimed to conform to ITU-T Rec. X.500-Series | ISO/IEC 9594 is required to complete a copy of the PICS proforma provided in Annex A and is required to provide the information necessary to identify both the supplier and the implementation.

The scope of this Recommendation | International Standard is the specification of the conformance statements for a Directory System Agent (DSA).

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. 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.500 (1993) | ISO/IEC 9594-1:1995, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services*.
- ITU-T Recommendation X.501 (1993) | ISO/IEC 9594-2:1995, *Information technology – Open Systems Interconnection – The Directory: Models*.
- ITU-T Recommendation X.509 (1993) | ISO/IEC 9594-8:1995, *Information technology – Open Systems Interconnection – The Directory: Authentication framework*.
- ITU-T Recommendation X.511 (1993) | ISO/IEC 9594-3:1995, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition*.
- ITU-T Recommendation X.518 (1993) | ISO/IEC 9594-4:1995, *Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation*.
- ITU-T Recommendation X.519 (1993) | ISO/IEC 9594-5:1995, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications*.
- ITU-T Recommendation X.520 (1993) | ISO/IEC 9594-6:1995, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types*.
- ITU-T Recommendation X.521 (1993) | ISO/IEC 9594-7:1995, *Information technology – Open Systems Interconnection – The Directory: Selected object classes*.
- ITU-T Recommendation X.525 (1993) | ISO/IEC 9594-9:1995, *Information technology – Open Systems Interconnection – The Directory: Replication*.

2.2 Paired Recommendations | International Standards equivalent in technical content

– 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*.

– 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 Directory definitions

This Recommendation | International Standard uses terms defined in ITU-T Rec. X.500-Series | ISO/IEC 9594, specifically ITU-T X.525 | ISO/IEC 9594-9.

3.2 Conformance definitions

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

a) Protocol Implementation Conformance Statement (PICS);

b) PICS proforma;

c) conformance;

d) mandatory requirement;

e) optional requirement;

f) conditional requirement.

3.3 Basic Directory Conformance definitions

The following terms are defined in this Recommendation | International Standard:

3.3.1 centralized DSA: A DSA that is not capable of holding knowledge information about other DSAs. Such a DSA is not capable of returning referrals.

3.3.2 cooperating DSA: A DSA that is capable of holding knowledge references. Such a DSA is capable of referrals, and may also be a chaining DSA.

3.3.3 chaining DSA: A cooperating DSA that is capable of invoking chained operations, functioning as a DSP invoker. A chaining DSA is also a cooperating DSA.

3.3.4 security level: Security levels shall be declared for peer entity authentication, originator authentication and results authentication, respectively.

a) For originator authentication, there are five security levels which are "none", "simple without password", "simple with unprotected password", "simple with protected password" and "strong".

b) For peer entity authentication, there are three security levels which are "none", "simple with distinguished name" and "strong".

c) For results authentication, there are two security levels which are "none" and "strong".

4 Abbreviations

For the purposes of this Protocol Implementation Conformance Statement, the following abbreviations apply:

ACI	Access Control Information
CCITT	International Telegraph & Telephone Consultative Committee
DIB	Directory Information Base
DISP	Directory Information Shadowing Protocol
DOP	Directory Operational Binding Management Protocol
DSA	Directory System Agent
DSE	DSA Specific Entry
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ITU	International Telecommunication Union
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
IUT	Implementation Under Test
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RDN	Relative Distinguished Name
RTSE	Reliable Transfer Service Element
SDSE	Shadowed DSA Specific Entry

5 Conventions

This Recommendation | International Standard refers exclusively to the second edition of the Directory Specifications listed in Clause 2.

6 Conformance

A conforming PICS proforma shall be technically equivalent to ITU-T Rec. X.500-Series | ISO/IEC 9594 and shall preserve the numbering and ordering of the items in ITU-T Rec. X.500-Series (1993) | ISO/IEC 9594:1995.

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

a) describe an implementation which conforms to the ITU-T Rec. X.500-Series | ISO/IEC 9594;

b) be a conforming PICS proforma, which has been completed in accordance with the instructions for completion given in A.2;

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

Annex A[1)]

Directory Operational Binding Management Protocol – Protocol Implementation Conformance Statement (PICS) proforma (This annex forms an integral part of this Recommendation | International Standard)

A.1 Identification of the ICS proforma corrigenda

The supplier of the PICS proforma shall identify any corrigenda (i.e. Technical Corrigenda or equivalent) to the published proforma that have been applied. Suppliers of the proforma should modify the proforma, or attach relevant additional pages in order to apply the corrigenda, and then record the application of the corrigenda in the table below.

Identification of corrigenda applied to this PICS proforma	ITU-T X.585 (1997) | ISO/IEC 13248-3:1998 Corr: Corr: Corr: Corr:

A.2 Instructions

A.2.1 Purpose and structure of the proforma

The purpose of this PICS proforma is to provide suppliers of implementations of ITU-T Rec. X.500-Series (1993) | ISO/IEC 9594:1995 with consistent means of stating which capabilities have been implemented.

The proforma is in the form of a questionnaire and consists of a set of items. An item is provided for each capability for which an implementation choice is allowed. Items are also provided for mandatory capabilities for which no implementation choice is allowed. Each item includes an item number, item description, a status value specifying the support requirement, and room for a support answer to be provided by the supplier.

This subclause provides general information and instructions for completion of the proforma.

Subclause A.3 is for the identification of the implementation.

Subclause A.4 is for identifying the protocol within ITU-T Rec. X.500-Series | ISO/IEC 9594.

Subclause A.5 is for the identification of the Technical Corrigenda to the protocol.

Subclause A.6 contains tables in which the supplier specifies details of the implementation options chosen.

A.2.2 Symbols, terms, and abbreviations

A.2.2.1 Introduction

Notations have been introduced in order to reduce the size of the tables in the PICS proforma. These have allowed the use of multi-column layout where the columns are headed 'Status' and 'Support'. Definitions of each are given below. Additionally, the following definitions apply:

A.2.2.1.1 (PICS) item: A row in the PICS proforma table.

[1)] **Copyright release for ICS proforma**

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

A.2.2.1.2 (PICS) question: The question to be answered in the intersection of a PICS item and either a support column (i.e. "Is this item supported in the context applying to this table and column?") or supported value column (i.e. "What values are supported for this item in the context applying to this table and column?") in a PICS proforma table.

A.2.2.1.3 status (value): An allowed entry in the status column for an item in a PICS proforma table.

A.2.2.1.4 (support) answer: An allowed entry in the support or supported values columns for an item in a PICS, in answer to a PICS question.

A.2.2.2 Prerequisite notation

If a predicate applies to a whole table, a prerequisite line may be specified in front of the table to which it applies. A prerequisite line takes the form:

Prerequisite: <Predicate>

The meaning of such a line is that if <predicate> is True, then the table applies, else it is not applicable.

A.2.2.3 Item reference numbers

Each line within the PICS proforma is numbered at the left-hand edge of the line. This numbering is included as a means of uniquely identifying all possible implementation details within the PICS proforma. This referencing is used both inside the PICS proforma, and for references from other test specification documents.

The means of referencing individual responses is done by the following sequence:

- a reference to the smallest enclosing the relevant item;
- a solidus character, '/';
- the reference number of the row in which the response appears;
- if, and only if, more than one response occurs in the row identified by the reference number, then each possible entry is implicitly labeled a, b, c, etc., from left to right, and this letter is appended to the sequence.

An example of the use of this notation would be A.6.2.3.1.1/1, which refers to the support for credentials in a DirectoryBind protocol data unit.

A.2.2.4 Status column

This column indicates the level of support required for conformance to this Recommendation | International Standard.

The values are as follows:

m The capability is required to be implemented in conformance with the related specification

o The capability may be implemented and if it is implemented it is required to conform to the related specification

c The requirement on the capability depends on the selection of other optional or conditional items

i The capability is outside the scope of this PICS and hence irrelevant and not subject to conformance testing

– In the given context it is impossible to use this capability

Nested conditionals are denoted by nested numbering (e.g. 1, 1.1, 1.1.1, etc.) of the item descriptions in the tables. A table may have zero, one or more levels of nesting. The status of a leading item is specified by its status entry, as defined above. The status of a subordinate (that is nested) item is specified as follows: if the superior item is supported, the status of the subordinate item is determined by its status column entry and applicable predicate, if any. If the superior item is not supported, the subordinate item is not applicable, independent of its status column entry.

A.2.2.5 Support column

This column shall be completed by the supplier or implementor, to indicate the level of implementation of each item. An item is not considered implemented simply because a default value has been defined by the standard. In order for an Implementation Under Test (IUT) to claim a protocol element is implemented, it must have the ability, where appropriate, to generate, receive, and perform the appropriate action.

The proforma is designed such that support values are:

Y Yes, the item has been implemented

N No, the item has not been implemented

– The item is not applicable

A.2.2.6 Definition of support

A capability is said to be supported if the Implementation Under Test (IUT) is able:

– to generate the corresponding operation parameters (either automatically or because the invoker explicitly requires that capability);

– to interpret, handle, and when required, make available to the invoker the corresponding error or result.

A protocol element is said to be supported for a sending implementation if the IUT is able to generate it under some circumstances (either automatically or because the invoker requires relevant services explicitly).

A protocol element is said to be supported for a receiving implementation if it is correctly interpreted and handled and, when appropriate, made available to the invoker.

A.2.2.7 Predicate column

The item number contained in the predicate column, if any, means that the status in the "Status" column applies only when the PICS states that one or more features identified by the item is supported.

A.2.2.8 Predicate name

The predicate name indicates that name upon which the predicate is based. A predicate name flagged with an asterisk preceding the predicate name indicates the condition by which the predicate is being set. A predicate name not flagged with an asterisk indicates the predicate on which the conditional support is based.

A.2.2.9 Note column

This column indicates the following:

notexx Refers to Note xx

d(xx) A default value xx within ( ) is defined in the standard. When absent in the PDU, both sender and receiver shall interpret it as having the default value specified in the standard

See xx Refers to Table xx

A.2.3 Instructions for completing the PICS proforma

The supplier shall complete all entries in the column marked 'Support'. In certain clauses of the PICS proforma, further guidance for completion may be necessary. Such guidance shall supplement the guidance given in this clause and shall have a scope restricted to the clause in which it appears. 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.

All entries within the PICS proforma shall be made in ink. Alterations to such entries shall be made by crossing out, not erasing or making the original entry illegible, and writing the new entry alongside the alteration.

All such alterations to records shall be initialized by the staff making them.

A.3 Identification of the implementation

A.3.1 Identification of PICS

Item No.	Question	Response
1	Date of Statement (DD/MM/YY)	
2	PICS Serial Number	
3	System Conformance Statement Cross Reference	

A.3.2 Identification of the implementation and/or system

Item No.	Question	Response
1	Implementation Name	
2	Version Number	
3	Machine Name	
4	Machine Version Number	
5	Operating System Name	
6	Operating System Version No.	
7	Special Configuration	
8	Other information	

A.3.3 Identification of the system supplier

Item No.	Question	Response
1	Organization Name	
2	Contact Name(s)	
3	Address	
4	Telephone Number	
5	Telex Number	
6	Fax Number	
7	E-Mail Address	
8	Other information	

A.3.4 Identification of the testlab client

Item No.	Question	Response
1	Organization Name	
2	Contact Name(s)	
3	Address	
4	Telephone Number	
5	Telex Number	
6	Fax Number	
7	E-Mail Address	
8	Other information	

A.4 Identification of the protocol

Item No.	Identification of protocol specification	Support
1	ITU-T Rec. X.500 (1993) | ISO/IEC 9594-1:1995, Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services	
2	ITU-T Rec. X.501 (1993) | ISO/IEC 9594-2:1995, Information technology – Open Systems Interconnection – The Directory: Models	
3	ITU-T Rec. X.511 (1993) | ISO/IEC 9594-3:1995, Information technology – Open Systems Interconnection – The Directory: Abstract service definition	
4	ITU-T Rec. X.518 (1993) | ISO/IEC 9594-4:1995, Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operations	
5	ITU-T Rec. X.519 (1993) | ISO/IEC 9594-5:1995, Information technology – Open Systems Interconnection – The Directory: Protocol specifications	
6	ITU-T Rec. X.520 (1993) | ISO/IEC 9594-6:1995, Information technology – Open Systems Interconnection – The Directory: Selected attribute types	
7	ITU-T Rec. X.521 (1993) | ISO/IEC 9594-7:1995, Information technology – Open Systems Interconnection – The Directory: Selected object classes	
8	ITU-T Rec. X.509 (1993) | ISO/IEC 9594-8:1995, Information technology – Open Systems Interconnection – The Directory: Authentication framework	
9	ITU-T Rec. X.525 (1993) | ISO/IEC 9594-9:1995, Information technology – Open Systems Interconnection – The Directory: Replication	

A.5 Identification of corrigenda to the protocol

Item No.	Specification	Technical Corrigenda	Support
1	ITU-T Rec. X.501 (1993) | ISO/IEC 9594-2:1995	Cor.1: 1995	
2	ITU-T Rec. X.501 (1993) | ISO/IEC 9594-2:1995	Cor.2: 1995	
3	ITU-T Rec. X.509 (1993) | ISO/IEC 9594-8:1995	Cor.1: 1995	
4	ITU-T Rec. X.509 (1993) | ISO/IEC 9594-8:1995	Cor.2: 1995	
5	ITU-T Rec. X.509 (1993) | ISO/IEC 9594-8:1995	Cor.3: 1995	
6	ITU-T Rec. X.511 (1993) | ISO/IEC 9594-3:1995	Cor.1: 1995	
7	ITU-T Rec. X.511 (1993) | ISO/IEC 9594-3:1995	Cor.2: 1995	
8	ITU-T Rec. X.518 (1993) | ISO/IEC 9594-4:1995	Cor.1: 1995	
9	ITU-T Rec. X.518 (1993) | ISO/IEC 9594-4:1995	Cor.2: 1995	
10	ITU-T Rec. X.519 (1993) | ISO/IEC 9594-5:1995	Cor.1: 1995	
11	ITU-T Rec. X.520 (1993) | ISO/IEC 9594-6:1995	Cor.1: 1995	
12	ITU-T Rec. X.525 (1993) | ISO/IEC 9594-9:1995	Cor.1: 1995	
13	ITU-T Rec. X.525 (1993) | ISO/IEC 9594-9:1995	Cor.2: 1995	

A.6 ICS proforma tables

A.6.1 General capabilities and global statement of conformance

Answering "No" to A.6.1.1/1 indicates non-conformance to the protocol specification. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conformant. Such information shall be provided in A.6.3 "Other information".

A.6.1.1 General capabilities

Item No.	Question	Status	Support	Predicate Name
1	Are all mandatory general capabilities implemented as defined by ITU-T Rec. X.500-Series | ISO/IEC 9594?	m		
2	Are minimum knowledge requirements (ITU-T Rec. X.518 | ISO/IEC 9594-4) implemented?	m		
3	Is asynchronous (ROSE class 2) mode of operation supported?	m		

A.6.1.2 Supported Security Levels

Item No.	Supported Security Levels	Status	Support	Predicate Name
1	none	o.1		
2	simple	o.1		*Simple-DSA
3	strong	o.1		*Strong-DSA
4	external	i		
o.1: At least one security level must be supported.				

A.6.1.3 Supported Operational Binding Types

Item No.	Supported Operational Binding types	Status	Support	Predicate Name
1	shadowOperationalBinding	o		*Shadow-Bind
2	specificHierarchicalBinding	o		*S-Hier-Bind
3	non-specificHierarchicalBinding	o		*NS-Hier-Bind

A.6.2 Capabilities and options

This part of the PICS proforma identifies the supported application context, the PDUs and operations. Finally, the operation arguments and PDU parameters are identified.

A.6.2.1 Supported application context

Item No.	Supported Application-Contexts	Status	Support	Predicate Name
1	directoryOperationalBindingManagementAC	m		
2	directorySystemAC	m		
3	shadowSupplierInitiatedAC H1	o.2		*Supplier
4	shadowConsumerInitiatedAC H1	o.2		*Consumer
5	shadowSupplierInitiatedAsynchronousAC H1	o.2		*Supplier
6	shadowConsumerInitiatedAsynchronousAC H1	o.2		*Consumer
7	reliableShadowSupplierInitiatedAC H1	c1		
8	reliableShadowConsumerInitiatedAC H1	c2		

c1: If [Supplier] then support of this feature is o else –.

c2: If [Consumer] then support of this feature is o else –.

o.2: If [Shadow-Bind] then at least one AC shall be supported as specified in 7.2.3.1, 7.2.3.2 and 9.3.1a of ITU-T Rec. X.519 | ISO/IEC 9594-5.

H1 Support of these application contexts requires a DISP PICS to be submitted.

A.6.2.2 **Operations** (Ref. X.501 | 9594-2, 24)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	dsaOperationalBindingManagementBind	m			
2	dsaOperationalBindingManagementUnbind	m			
3	EstablishOperationalBinding	o		*Establish	
4	ModifyOperationalBinding	o		*Modify	
5	TerminateOperationalBinding	o		*Terminate	

A.6.2.3 Protocol Elements

A.6.2.3.1 DSA Operational Binding Management Bind Protocol Elements (Ref. X.501 | 9594-2, 24.6.1)

A.6.2.3.1.1 DSA Operational Binding Management Bind Arguments (Ref. X.511 | 9594-3, 8.1.2)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	credentials	c3			
1.1	simple	c: c4			
1.1.1	name	c:m			
1.1.2	validity	c:o			
1.1.2.1	time1	c:o			
1.1.2.2	time2	c:o			
1.1.2.3	random1	c:o			
1.1.2.4	random2	c:o			
1.1.3	password	c:o			
1.1.3.1	unprotected	c:o.3			
1.1.3.2	protected	c:o.3			
1.1.3.2.1	algorithmIdentifier	c:m		*Algor-ID	See A.6.2.3.8.2
1.1.3.2.2	encrypted	c:m			
1.2	strong	c: c5			
1.2.1	certification-path	c:o		*Cert-Path	See A.6.2.3.8
1.2.2	bind-token	c:m			
1.2.2.1	toBeSigned	c:m			
1.2.2.1.1	algorithm	c:m			
1.2.2.1.2	name	c:m			
1.2.2.1.3	time	c:m			
1.2.2.1.4	random	c:m			
1.2.2.2	algorithmIdentifier	c:m		*Algor-ID	See A.6.2.3.8.2
1.2.2.3	encrypted	c:m			
1.2.3	name	c:o			
1.3	externalProcedure	i			
2	versions	m			d(v1)

c3: If [Simple-DSA or Strong-DSA] then support of this feature is m else support is o.

c4: If [Simple-DSA] then support of this feature is m else o.

c5: If [Strong-DSA] then support of this feature is m else o.

o.3: The password, for the DSA, may be unprotected and/or protected as described in clause 6 of ITU-T Rec. X.509 | ISO/IEC 9594-8.

A.6.2.3.1.2 DSA Operational Binding Management Bind Result (Ref. X.511 | 9594-3, 8.1.2)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	credentials	c3			
1.1	simple	c: c4			
1.1.1	name	c:m			
1.1.2	validity	c:o			
1.1.2.1	time1	c:o			
1.1.2.2	time2	c:o			
1.1.2.3	random1	c:o			
1.1.2.4	random2	c:o			
1.1.3	password	c:o			
1.1.3.1	unprotected	c:o.3			
1.1.3.2	protected	c:o.3			
1.1.3.2.1	algorithmIdentifier	c:m		*Algor-ID	See A.6.2.3.8.2
1.1.3.2.2	encrypted	c:m			
1.2	strong	c: c5			
1.2.1	certification-path	c:o		*Cert-Path	See A.6.2.3.8
1.2.2	bind-token	c:m			
1.2.2.1	toBeSigned	c:m			
1.2.2.1.1	algorithm	c:m			
1.2.2.1.2	name	c:m			
1.2.2.1.3	time	c:m			
1.2.2.1.4	random	c:m			
1.2.2.2	algorithmIdentifier	c:m		*Algor-ID	See A.6.2.3.8.2
1.2.2.3	encrypted	c:m			
1.2.3	name	c:o			
1.3	externalProcedure	i			
2	versions	m			d(v1)

c3: If [Simple-DSA or Strong-DSA] then support of this feature is m else support is o.

c4: If [Simple-DSA] then support of this feature is m else o.

c5: If [Strong-DSA] then support of this feature is m else o.

o.3: The password, for the DSA, may be unprotected and/or protected as described in clause 5 of ITU-T Rec. X.509 | ISO/IEC 9594-8.

A.6.2.3.1.3 DSA Operational Binding Management Bind Error (Ref. X.511 | 9594-3, 8.1.4)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	versions	m			d(v1)
2	error	m			
2.1	ServiceError	m			
2.2	SecurityError	m			

A.6.2.3.2 DSA Operational Binding Management Unbind Elements (Ref. X.511 | 9594-3, 8.2)

DSAOperationalBindingManagementUnbind has no arguments (see 8.2 of ITU-T Rec. X.511 | ISO/IEC 9594-3)

A.6.2.3.3 Establish Operational Binding Elements

A.6.2.3.3.1 Establish Operational Binding Argument (Ref. X.501 | 9594-2, 24.2)

Prerequisite: [Establish]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	bindingType	m			
2	bindingID	o			
2.1	identifier	c:m			
2.2	version	c:m			
3	accessPoint	m			See A.6.2.3.7
4	initiator	o			
4.1	symmetric	c:m			
4.2	roleA-initiates	c:m			
4.3	roleB-initiates	c:m			
5	agreement	m			
6	valid	m			d({})
6.1	validFrom	m			d(now)
6.1.1	now	m			NULL
6.1.2	time	m			
6.2	validUntil	m			d(explicitTermina-tion)
6.2.1	explicitTermination	m			NULL
6.2.2	time	m			

A.6.2.3.3.2 Establish Operational Binding Result (Ref. X.501 | 9594-2, 24.2)

Prerequisite: [Establish]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	bindingType	m			
2	bindingID	o			
2.1	identifier	c:m			
2.2	version	c:m			
3	accessPoint	m			See A.6.2.3.7
4	initiator	o			
4.1	symmetric	c:m			
4.2	roleA-replies	c:m			
4.3	roleB-replies	c:m			

A.6.2.3.4 Modify Operational Binding Elements (Ref. X.501 | 9594-2, 24.3)

Prerequisite: [Modify]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	ModifyOperationalBindingArgument	m			
1.1	bindingType	m			
1.2	bindingID	m			
1.2.1	identifier	m			
1.2.2	version	m			
1.3	accessPoint	o			See A.6.2.3.7
1.4	initiator	o			
1.4.1	symmetric	c:m			
1.4.2	roleA-initiates	c:m			
1.4.3	roleB-initiates	c:m			
1.5	newBindingID	m			
1.5.1	identifier	m			
1.5.2	version	m			
1.6	newAgreement	o			
1.7	valid	o			
1.7.1	validFrom	c:m			d(now)
1.7.1.1	now	c:m			NULL
1.7.1.2	time	c:m			
1.7.2	validUntil	c:m			d(explicitTermination)
1.7.2.1	explicitTermination	c:m			NULL
1.7.2.2	time	c:m			
2	ModifyOperationalBindingResult	m			NULL

A.6.2.3.5 Terminate Operational Binding Elements (Ref. X.501 | 9594-2, 24.4)

Prerequisite: [Terminate]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	TerminateOperationalBindingArgument	m			
1.1	bindingType	m			
1.2	bindingID	m			
1.2.1	identifier	m			
1.2.2	version	m			
1.3	initiator	o			
1.3.1	symmetric	c:m			
1.3.2	roleA-initiates	c:m			
1.3.3	roleB-initiates	c:m			
1.4	terminateAt	o			
2	TerminateOperationalBindingResult	m			NULL

A.6.2.3.6 Errors and Parameters (Ref. X.501 | 9594-2, 24.5)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	operationalBindingError	m			
1.1	OpBindingErrorParam	m			
1.1.1	problem	m			
1.1.1.1	invalidID	m			
1.1.1.2	duplicateID	m			
1.1.1.3	unsupportedBindingType	m			
1.1.1.4	notAllowedForRole	m			
1.1.1.5	parametersMissing	m			
1.1.1.6	roleAssignment	m			
1.1.1.7	invalidStartTime	m			
1.1.1.8	invalidEndTime	m			
1.1.1.9	invalidAgreement	m			
1.1.1.10	currentlyNotDecidable	m			
1.1.1.11	modificationNotAllowed	m			
1.1.2	bindingType	o			
1.1.3	agreementProposal	o			
1.1.4	retryAt	o			

A.6.2.3.7 Access Point (Ref. X.518 | 9594-4, 10.8)

Item No.	Protocol Elements	Status	Support	Predicate	Note
1	ae-title	m			
2	address	m			
2.1	pSelector	o			
2.2	sSelector	o			
2.3	tSelector	o			
2.4	nAddresses	m			
3	protocolInformation	o			

A.6.2.3.8 CertificationPath (Ref. X.509 | 9594-8, 8)

Prerequisite: [Cert-Path]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	userCertificate	m			
1.2	theCACertificates	o			
1.2.1	forward	c:o.4			
1.2.2	reverse	c:o.4			
o.4: At least one of the pair shall be present as specified in clause 8 of ITU-T X.509 | ISO/IEC 9594-8.					

A.6.2.3.8.1 Certificate (Ref. X.509 | 9594-8, 8)

Prerequisite: [Cert-Path]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	toBeSigned	m			
1.1	version	m			d(v1)
1.2	serialNumber	m			
1.3	signature	m			See A.6.2.3.8.2
1.4	issuer	m			
1.5	validity	m			
1.5.1	notBefore	m			
1.5.2	notAfter	m			
1.6	subject	m			
1.7	subjectPublicKeyInfo	m			
1.7.1	algorithm	m			
1.7.2	subjectPublicKey	m			
1.8	issuerUniqueIdentifier	o			Note
1.9	subjectUniqueIdentifier	o			Note
1.10	extension	c6		*Extensions	See A.6.2.3.8.3
2	algorithmIdentifier	m		*Algor-ID	See A.6.2.3.8.2
3	encrypted	m			
c6: If version3 then support of this feature is m else o. NOTE – If present, version must be 2 or 3.					

A.6.2.3.8.2 Algorithm Identifier (Ref. X.509 | 9594-8, 8)

Prerequisite: [Algor-ID]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	algorithm	m			
2	parameters	m			

A.6.2.3.8.3 Extensions (Ref. X.509 | 9594-8, 8)

Prerequisite: [Extensions]

Item No.	Protocol Element	Status	Support	Predicate	Note
1	extnID	m			
2	critical	m			d{FALSE}
3	cxtnValue	m			

A.6.2.4 Operational Bindings

A.6.2.4.1 Shadow Operational Binding (Ref. X.525 | 9594-9, 8.3)

Prerequisite: [Shadow-Bind]

Item No.	Information Objects	Protocol Element	Status	Support	Predicate	Note
1	AGREEMENT		m			
1.1		ShadowingAgreementInfo	m			
1.2		shadowSubject	m			
1.3		updateMode	m			
1.4		master	o			
1.5		secondaryShadows	m			
2	APPLICATION CONTEXTS		m			
2.1	shadowSupplierInitiatedAC		m			APPLIES TO All-operations-supplier-initiated
2.2	shadowConsumerInitiatedAC		m			APPLIES TO All-operations-consumer-initiated
2.3	reliableShadowSupplierInitiatedAC		o			APPLIES TO All-operations-supplier-initiated
2.4	reliableShadowConsumerInitiatedAC		o			APPLIES TO All-operations-consumer-initiated
3	ASYMMETRIC		m			
3.1	ROLE-A		m			APPLIES TO All-operations-supplier-initiated
3.1.1	ESTABLISHMENT-INITIATOR		m			true
3.1.2	ESTABLISHMENT-PARAMETER		m			Null
3.1.3	MODIFICATION-INITIATOR		m			true
3.1.4	TERMINATION-INITIATOR		m			true
3.2	ROLE-B		m			
3.2.1	ESTABLISHMENT-INITIATOR		m			true
3.2.2	ESTABLISHMENT-PARAMETER		m			Null
3.2.3	MODIFICATION-INITIATOR		m			true
3.2.4	MODIFICATION-PARAMETER		m			
3.2.4.1	secondaryShadows		m			
3.2.5	TERMINATION-INITIATOR		m			true
4	ID		m			= id-op-binding-shadow

A.6.2.4.2 Specific Hierarchical Operational Binding (Ref. X.518 | 9594-4, 24.2)

Prerequisite: [S-Hier-Bind]

Item No.	Information Objects	Protocol Element	Status	Support	Predicate	Note
1	AGREEMENT		m			
1.1		HierarchicalAgreement	m			
1.2		rdn	m			
1.3		immediateSuperior	m			
2	APPLICATION CONTEXTS		m			directorySystemAC
3	ASYMMETRIC		m			
3.1	ROLE-A		m			
3.1.1	ESTABLISHMENT-INITIATOR		m			true
3.1.2	ESTABLISHMENT-PARAMETER	SuperiorToSubordinate	m			
3.1.3	MODIFICATION-INITIATOR		m			true
3.1.4	MODIFICATION-PARAMETER	SuperiorToSubordinateModification	m			Note
3.1.5	TERMINATION-INITIATOR		m			true
3.2	ROLE-B		m			
3.2.1	ESTABLISHMENT-INITIATOR		m			true
3.2.2	ESTABLISHMENT-PARAMETER	SubordinateToSuperior	m			
3.2.3	MODIFICATION-INITIATOR		m			true
3.2.4	MODIFICATION-PARAMETER	SubordinateToSuperior	m			
3.2.5	TERMINATION-INITIATOR		m			true
4	ID		m			id-op-binding-hierarchical
NOTE – Support of this feature requires that the DSA support the SuperiorToSubordinate (see A.6.2.4.4) element with the entryinfo component absent.						

A.6.2.4.3 NonSpecificHierarchical Operational Binding (Ref. X.518 | 9594-4, 25.2)

Prerequisite: [NS-Hier-Bind]

Item No.	Information Objects	Protocol Element	Status	Support	Predicate	Note
1	AGREEMENT		m			
1.1		NonSpecificHierarchicalAgreement	m			
1.2		immediateSuperior	m			
2	APPLICATION CONTEXTS		m			directorySystemAC
3	ASYMMETRIC		m			
3.1	ROLE-A		m			
3.1.1	ESTABLISHMENT-PARAMETER	NHOBSuperiorToSubordinate	m			Note 1
3.1.2	MODIFICATION-INITIATOR		m			true
3.1.3	MODIFICATION-PARAMETER	NHOBSuperiorToSubordinate	m			Note 1
3.1.4	TERMINATION-INITIATOR		m			true
3.2	ROLE-B		m			
3.2.1	ESTABLISHMENT-INITIATOR		m			true
3.2.2	ESTABLISHMENT-PARAMETER	NHOBSubordinateToSuperior	m			Note 2
3.2.3	MODIFICATION-INITIATOR		m			true
3.2.4	MODIFICATION-PARAMETER	NHOBSubordinateToSuperior	m			Note 2
3.2.5	TERMINATION-INITIATOR		m			true
4	ID		m			= id-op-binding-non-specific-hierarchical

NOTE 1 – Support of this feature requires that the DSA support the SuperiorToSubordinate (see A.6.2.4.4) element with the entryinfo component absent.

NOTE 2 – Support of this feature requires that the DSA support the SubordinateToSuperior (see A.6.2.4.5) element with the alias and entryinfo components absent.

A.6.2.4.4 Superior to Subordinate Elements (Ref. X.518 | 9594-4, 24.1.4.1)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	contextPrefixInfo	m			
1.1	Vertex	m			
1.1.2	rdn	m			
1.1.3	admPointInfo	o			
1.1.4	subentries	o			
1.1.4.1	rdn	c:m			
1.1.4.2	info	c:m			
1.1.5	accessPoints	o			
1.1.5.1	MasterOrShadowAccessPoint	c:m			
1.1.5.1.1	AccessPoint	c:m			See A.6.2.3.7
1.1.5.1.2	Category	c:m			d{master}
2	entryinfo	o			
3	ImmediateSuperiorInfo	o			

A.6.2.4.5 Subordinate to Superior Elements (Ref. X.518 | 9594-4, 24.1.4.2)

Item No.	Protocol Element	Status	Support	Predicate	Note
1	accessPoints	o			
1.1	MasterOrShadowAccessPoint	c:m			
1.1.1	AccessPoint	c:m			See A.6.2.3.7
1.1.2	Category	c:m			d{master}
2	alias	m			d(false)
3	entryinfo	o			

A.6.3 Other information

The following table can be used to provide any additional information.

Index	Other information

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	**Data networks and open system communications**
Series Y	Global information infrastructure
Series Z	Programming languages