
**Information technology — Open Systems
Interconnection — The Directory: Protocol
Implementation Conformance Statement
(PICS) proforma for the Directory Access
Protocol**

*Technologies de l'information — Interconnexion de systèmes ouverts
(OSI) — L'annuaire: Proformes de déclaration de conformité de mise en
œuvre du protocole (PICS) pour le protocole d'accès de l'annuaire*

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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 13248-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 33, *Distributed application services*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.583.

ISO/IEC 13248 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — The Directory*:

- *Part 1: Protocol Implementation Conformance Statement (PICS) proforma for the Directory Access Protocol*
- *Part 2: Protocol Implementation Conformance Statement (PICS) proforma for the Directory System Protocol*
- *Part 3: Protocol Implementation Conformance Statement (PICS) proforma for the Directory Operational Binding Management Protocol*
- *Part 4: Protocol Implementation Conformance Statement (PICS) proforma for the Directory Information Shadowing Protocol*

Annex A forms an integral part of this part of ISO/IEC 13248.

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 management;
- 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 Access Protocol (DAP) 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 9594:1995).

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

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

**INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION –
THE DIRECTORY: PROTOCOL IMPLEMENTATION CONFORMANCE
STATEMENT (PICS) PROFORMA FOR THE DIRECTORY ACCESS PROTOCOL**

1 Scope

This Recommendation | International Standard provides the PICS proforma for the Directory Access Protocol (DAP) 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 DAP 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 User Agent (DUA) and 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.*

2.3 Additional references

ISO/IEC 10646-1:1993 as amended, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane.*

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.

3.2 Conformance definitions

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

- Protocol Implementation Conformance Statement (PICS);
- PICS proforma;
- conformance;
- mandatory requirement;
- optional requirement;
- 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 returning 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 levels: 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
DAP	Directory Access Protocol
DISP	Directory Information Shadowing Protocol
DIB	Directory Information Base
DIT	Directory Information Tree
DOP	Directory Operational Binding Management Protocol
DSA	Directory System Agent
DSP	Directory System Protocol
DUA	Directory User Agent
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
NSSR	Non-Specific Subordinate Reference
NSAP	Network Service Access Point
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RDN	Relative Distinguished Name
ROSE	Remote Operations Service Element

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 A¹⁾

**Directory access 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.583 (1997) ISO/IEC 13248-1:1998
	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.

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.

¹⁾ **Copyright release for ICS proforma**

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

A.2.2.1.4 (support) answer: An allowed entry in the support values columns for an item in 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.6.3.3.1.1/1, 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.

The Status "DUA" or "DSA" identifies whether the implementation is a DUA or DSA, respectively.

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 end user explicitly requires that capability);
- to interpret, handle and, when required, make available to the end user the corresponding error or result.

A protocol element is said to be supported for a sending implementation if it is able to generate it under some circumstances (either automatically or because the end user 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 end user.

An object class is said to be supported if the IUT is able to construct entries of that object class. Support of an object class also requires support of the object identifier(s) of the superclass(es) of that object class.

An attribute type is said to be supported by a DUA implementation if the DUA supports those aspects of the attribute syntax which are pertinent to encoding, decoding or both of the attribute.

An attribute type is said to be supported by a DSA implementation if the DSA supports the specified syntax, and hence data types, to which every value in such attributes shall conform.

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.

Note that the predicate may be set by the DUA or DSA but only applies for the type of agent claiming support. For example, if an implementation includes both a DUA and a DSA, then if the DSA supports the Read operation (which is mandatory for a DSA), the "Read" predicate will be set for the DSA only. If the Read operation is also supported for the DUA (which is optional) the predicate would be set for both the DUA and DSA.

A.2.2.9 Note column

This column indicates the following:

notxx: 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	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, <i>Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services</i>	
2	ITU-T Rec. X.501 (1993) ISO/IEC 9594-2:1995, <i>Information technology – Open Systems Interconnection – The Directory: Models</i>	
3	ITU-T Rec. X.511 (1993) ISO/IEC 9594-3:1995, <i>Information technology – Open Systems Interconnection – The Directory: Abstract service definition</i>	
4	ITU-T Rec. X.518 (1993) ISO/IEC 9594-4:1995, <i>Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operations</i>	
5	ITU-T Rec. X.519 (1993) ISO/IEC 9594-5:1995, <i>Information technology – Open Systems Interconnection – The Directory: Protocol specifications</i>	
6	ITU-T Rec. X.520 (1993) ISO/IEC 9594-6:1995, <i>Information technology – Open Systems Interconnection – The Directory: Selected Attribute Types</i>	
7	ITU-T Rec. X.521 (1993) ISO/IEC 9594-7:1995, <i>Information technology – Open Systems Interconnection – The Directory: Selected object classes</i>	
8	ITU-T Rec. X.509 (1993) ISO/IEC 9594-8:1995, <i>Information technology – Open Systems Interconnection – The Directory: Authentication framework</i>	
9	ITU-T Rec. X.525 (1993) ISO/IEC 9594-9:1995, <i>Information technology – Open Systems Interconnection – The Directory: Replication</i>	

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 Roles

Item No.	Role	Status	Support	Predicate Name
1	Centralized DSA	o		
2	Cooperating DSA	o		*CoOp-DSA
3	First-Level DSA	o		*FirstLevel-DSA
4	DUA for connection to centralized DSA	o		
5	DUA for connection to cooperating DSA	o		*CoOp-DUA

A.6.2 General capabilities and global statement of conformance

If the supplied implementation is a DSA implementation, A.6.2.1 is required to be answered by the supplier. In addition, appropriate DSA support/status columns in A.6.3, A.6.4 and A.6.5 apply.

If the supplied implementation is a DUA implementation, A.6.2.2 is required to be answered by the supplier. In addition, appropriate DUA support/status columns in A.6.3, A.6.4 and A.6.5 apply.

Answering "No" to A.6.2.1.1/1 or A.6.2.2.1/1 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.6.6 "Other information".

A.6.2.1 DSA Capabilities

A.6.2.1.1 General capabilities

Item No.	Question	Status	Support	Predicate Name
1	Are all mandatory general capabilities for the DSA implemented?	m		
2	Are all mandatory first-level DSA requirements (ITU-T Rec. X.518 ISO/IEC 9594-4) implemented?	c1		
3	Are the minimum knowledge requirements (ITU-T Rec. X.501 ISO/IEC 9594-2) implemented?	m		
4	Is asynchronous (ROSE class 2) mode of operation supported?	m		*Async-DSA
5	Does the DSA follow the rules of extensibility as defined in 7.5 of ITU-T Rec. X.519 ISO/IEC 9594-5?	m		
6	Is the alias mechanism implemented?	m		
7	Does the DSA support the directoryAccessAC application-context?	m		
8	Is the DSA capable of supporting collective attributes?	o		*Coll-Attr
9	Is the DSA capable of supporting hierarchical attributes (Subtypes)?	o		
10	Is the DSA capable of supporting auxiliary object classes?	o		
11	Is the DSA capable of supporting the subschema administrative operational attributes?	o		*SubSchema
12	Does the DSA support signed DAP operations and results?	o		*Signed-Ops
13	Does the DSA support NSSR?	o		*NSSR
c1: If [FirstLevel-DSA] then m else i				

A.6.2.1.2 Supported Security Levels

Item No.	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 The DSA must support at least one security level, unless the external mechanism is supported.				

A.6.2.1.3 Supported Access Control Schemes

Item No.	Access Control Scheme	Status	Support	Predicate Name
1	Simplified Access Control	o		*SAC-DSA
2	Basic Access Control	o		*BAC-DSA
3	Other	i		

A.6.2.2 DUA capabilities

A.6.2.2.1 General capabilities

Item No.	Question	Status	Support	Predicate Name
1	Are all mandatory general capabilities for the DUA implemented?	m		
2	Is the directoryAccessAC application-context supported?	m		
3	Is asynchronous (ROSE class 2) mode of operation supported?	o		*Async-DUA
4	Does the DUA follow the rules of extensibility as defined in 7.5 of ITU-T Rec. X.519 ISO/IEC 9594-5?	m		
5	Does the DUA support signed DAP operations and results?	o		*Signed-Ops

A.6.2.2.2 Supported Security Levels

Item No.	Question	Status	Support	Predicate Name
1	none	o.2		
2	simple	o.2		*Simple-DUA
3	strong	o.2		*Strong-DUA
4	external	i		
o.2: The DUA must support at least one security level, unless the external mechanism is supported.				

A.6.2.2.3 Supported Access Control Schemes

Item No.	Access Control Scheme	Status	Support	Predicate Name
1	Simplified Access Control	o		*SAC-DUA
2	Basic Access Control	o		*BAC-DUA
3	Other	i		

A.6.3 Capabilities and options

This part of the PICS proforma identifies the supported application context, the PDUs and operations.

In addition, the operation arguments and PDU parameters are identified.

A.6.3.1 Supported application context

The only application context supported by this PICS proforma is Directory Access application context.

A.6.3.2 Operations and extensions

A.6.3.2.1 Operations (Ref. X.511 | 9594-3)

Item No.	Protocol Element	DUA		DSA		Predicate Name	Note
		Status	Support	Status	Support		
1	DirectoryBind	m		m			
2	DirectoryUnbind	m		m			
3	Read	o		m		*Read	
4	Compare	o		m		*Compare	
5	Abandon	c2		c3		*Abandon	Note 1
6	List	o		m		*List	
7	Search	o		m		*Search	
8	AddEntry	o		m		*AddEntry	
9	RemoveEntry	o		m		*RemoveEntry	
10	ModifyEntry	o		m		*ModifyEntry	
11	ModifyDN	o		m		*ModifyDN	Note 2

c2: If [[Async-DUA] then support of this feature is o else –.

c3: If [Async-DSA] then support of this feature is m else –.

NOTE 1 – The Abandon operation can only be supported if the asynchronous mode (ROSE class 2) of operation is supported in A.6.2.1.1/4 or A.6.2.2.1/3 for DSA and DUA respectively.

NOTE 2 – 1988-edition systems may use the operation only to change the Relative Distinguished Name of a leaf entry.

A.6.3.2.2 Extensions (Ref. X.511 | 9594-3, 7.3.1)

This table defines a number of extensions which are available in the 1993 edition of the Directory. The supplier of the implementation shall indicate in the following table, for which extensions conformance is claimed.

Item No.	Extension	DUA		DSA		Predicate Name	Note
		Status	Support	Status	Support		
1	subentries	o		o		*Subentries	
2	copyShallDo	o		o			
3	attributesizelimit	o		o		*attrsizelimit	
4	extraAttributes	o		o			
5	modifyRightsRequest	o		o		*modrightsreq	
6	pagedResultsRequest	o		o		*pageresreq	Note
7	matchedValuesOnly	o		o		*matchvalonly	
8	extendedFilter	o		o		*extfilter	
9	targetSystem	o		o		*targetsystem	
10	useAliasOnUpdate	o		o			
11	newSuperior	o		o		*newsuperior	

NOTE – Paged results can only be supported for unsigned operations. DSAs which support signed operations should only return paged results when performing unsigned operations.

A.6.3.3 Protocol Elements

Some protocol elements may be digitally signed. In those cases where an operation can be signed, the PICS table is divided into signed / unsigned columns for the DUA and DSA respectively. Suppliers of implementations claiming conformance to signed protocol elements, for a given operation, should supply responses to the appropriate status/support columns under the signed column. Suppliers of implementations not claiming conformance to signed protocol elements should supply responses to the status/support columns under the unsigned column. Note that update operations return NULL results and that errors are often single integers. They therefore are not digitally signed. To do so could compromise the private key of the digital signature.

A.6.3.3.1 DirectoryBind Element (Ref. X.511 | 9594-3, 8.1)

A.6.3.3.1.1 Directory Bind Arguments (Ref. X.511 | 9594-3, 8.1.2)

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	credentials	c4		c4			
1.1	simple	c:c5		c:c5			
1.1.1	name	c:m		c:m			
1.1.2	validity	c:o		c:o			
1.1.2.1	time1	c:o		c:o			
1.1.2.2	time2	c:o		c:o			
1.1.2.3	random1	c:o		c:o			
1.1.2.4	random2	c:o		c:o			
1.1.3	password	c:o		c:o		*Password	
1.1.3.1	unprotected	c:o.3		c:o.3			
1.1.3.2	protected	c:o.3		c:o.3			
1.1.3.2.1	algorithmIdentifier	c:m		c:m		*Algor-ID	See A.6.3.3.23.2
1.1.3.2.2	encrypted	c:m		c:m			

A.6.3.3.1.1 Directory Bind Arguments (Ref. X.511 | 9594-3, 8.1.2) (continued)

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1.2	strong	c:c6		c:c6			
1.2.1	certification-path	c:o		c:o		*Cert-Path	See A.6.3.3.23
1.2.2	bind-token	c:m		c:m			
1.2.2.1	toBeSigned	c:m		c:m			
1.2.2.1.1	algorithm	c:m		c:m			
1.2.2.1.2	name	c:m		c:m			
1.2.2.1.3	time	c:m		c:m			
1.2.2.1.4	random	c:m		c:m			
1.2.2.2	algorithmIdentifier	c:m		c:m		*Algor-ID	See A.6.3.3.23.2
1.2.2.3	encrypted	c:m		c:m			
1.2.3	name	c:o		c:o			
1.3	externalProcedure	i		i			
2	versions	m		m			d(v1)
2.1	v1	m		m			
<p>c4: If [Strong-DUA or Simple-DUA, Simple-DSA or Strong-DSA] then support of this feature is m else o. c5: If [Simple-DUA, Simple-DSA] then support of this feature is m else o. c6: If [Strong-DUA, Strong-DSA] then support of this feature is m else o. o.3: At least one of the items must be supported.</p>							

A.6.3.3.1.2 Directory Bind Result (Ref. X.511 | 9594-3, 8.1.2)

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	credentials	c4		c4			
1.1	simple	c:c5		c:c5			
1.1.1	name	c:m		c:m			
1.1.2	validity	c:o		c:o			
1.1.2.1	time1	c:o		c:o			
1.1.2.2	time2	c:o		c:o			
1.1.2.3	random1	c:o		c:o			
1.1.2.4	random2	c:o		c:o			
1.1.3	password	c:o		c:o		*Password	
1.1.3.1	unprotected	c:o.3		c:o.3			
1.1.3.2	protected	c:o.3		c:o.3			
1.1.3.2.1	algorithmIdentifier	c:m		c:m		*Algor-ID	See A.6.3.3.23.2
1.1.3.2.2	encrypted	c:m		c:m			

A.6.3.3.1.2 Directory Bind Result (Ref. X.511 | 9594-3, 8.1.2) *(continued)*

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1.2	strong	c:c6		c:c6			
1.2.1	certification-path	c:o		c:o		*Cert-Path	See A.6.3.3.23
1.2.2	bind-token	c:m		c:m			
1.2.2.1	toBeSigned	c:m		c:m			
1.2.2.1.1	algorithm	c:m		c:m			
1.2.2.1.2	name	c:m		c:m			
1.2.2.1.3	time	c:m		c:m			
1.2.2.1.4	random	c:m		c:m			
1.2.2.2	algorithmIdentifier	c:m		c:m		*Algor-ID	See A.6.3.3.23.2
1.2.2.3	encrypted	c:m		c:m			
1.2.3	name	c:o		c:o			
1.3	externalProcedure	i		i			
2	versions	m		m			d(v1)
2.1	v1	m		m			
c4: If [Strong-DUA or Simple-DUA, Simple-DSA or Strong-DSA] then support of this feature is m else o. c5: If [Simple-DUA, Simple-DSA] then support of this feature is m else o. c6: If [Strong-DUA, Strong-DSA] then support of this feature is m else o. o.3: At least one of the items must be supported.							

A.6.3.3.1.3 Directory Bind Error (Ref. X.511 | 9594-3, 8.1.4)

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

A.6.3.3.2 Directory Unbind Elements (Ref. X.511 | 9594-3, 8.2)

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

A.6.3.3.3 Read Elements (Ref. X.511 | 9594-3, 9.1)

Prerequisite: [Read]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	ReadArgument	m		m		m		m			
1.1	toBeSigned	-		m		-		m			
1.2	object	m		m		m		m			
1.3	selection	m		m		m		m			d({})
1.4	modifyRightsRequest	c7		c7		c7		c7			d(false)
1.5	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.6	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
1.7	encrypted	-		m		-		m			
2	ReadResult	m		m		m		m			
2.1	toBeSigned	-		m		-		m			
2.2	entry	m		m		m		m			
2.3	modifyRights	o		o		o		o			
2.3.1	item	c:m		c:m		c:m		c:m			
2.3.1.1	entry	c:o		c:o		c:m		c:m			
2.3.1.2	attribute	c:o		c:o		c:m		c:m			
2.3.1.3	value	c:o		c:o		c:m		c:m			
2.3.2	permission	c:o		c:o		c:m		c:m			
2.4	CommonResults	m		m		m		m		*Comm-Res	See A.6.3.3.14
2.5	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
2.6	encrypted	-		m		-		m			
3	Errors	m		m		m		m			See A.6.3.3.12

c7: If [modrightsreq] then support of this feature is m else o.

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A.6.3.3.4 Compare Elements (Ref. X.511 | 9594-3, 9.2)

Prerequisite: [Compare]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	CompareArgument	m		m		m		m			
1.1	toBeSigned	-		m		-		m			
1.2	object	m		m		m		m			
1.3	purported	m		m		m		m			
1.4	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.5	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
1.6	encrypted	-		m		-		m			
2	CompareResult	m		m		m		m			
2.1	toBeSigned	-		m		-		m			
2.2	name	o		o		o		o			
2.3	matched	m		m		m		m			
2.4	fromEntry	o		o		m		m			d(true)
2.5	matchedSubtype	o		o		o		o			
2.6	CommonResults	m		m		m		m		*Comm-Res	See A.6.3.3.14
2.7	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
2.8	encrypted	-		m		-		m			
3	Errors	m		m		m		m			See A.6.3.3.12

A.6.3.3.5 Abandon Elements (Ref. X.511 | 9594-3, 9.3)

Prerequisite: [Abandon]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	AbandonArgument	m		m			
1.1	InvokeID	m		m			
2	AbandonResult	m		m			
3	Errors	m		m			AbandonFailed error

A.6.3.3.6 List Elements (Ref. X.511 | 9594-3, 10.1)

Prerequisite: [List]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	ListArgument	m		m		m		m			
1.1	toBeSigned	–		m		–		m			
1.2	object	m		m		m		m			
1.3	pagedResults	c8		c8		c8		c8			See A.6.3.3.20
1.4	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.5	algorithmIdentifier	–		m		–		m		*Algor-ID	See A.6.3.3.23.2
1.6	encrypted	–		m		–		m			
2	ListResult	m		m		m		m			
2.1	toBeSigned	–		m		–		m			
2.2	listInfo	m		m		m		m			
2.2.1	name	o		o		o		o			
2.2.2	subordinates	m		m		m		m			
2.2.2.1	rdn	m		m		m		m			
2.2.2.2	aliasEntry	o		o		m		m			d(false)
2.2.2.3	fromEntry	o		o		m		m			d(true)
2.2.3	partialOutcomeQualifier	o		o		m		m			
2.2.3.1	limitProblem	c:o		c:o		–o		–o			
2.2.3.1.1	timeLimitExceeded	c:m		c:m		c:m		c:m			
2.2.3.1.2	sizeLimitExceeded	c:m		c:m		c:m		c:m			
2.2.3.1.3	administrativeLimitExceeded	c:m		c:m		c:m		c:m			
2.2.3.2	unexplored	c:o		c:o		o		o			See A.6.3.3.21
2.2.3.3	unavailableCriticalExtensions	c:m		c:m		m		m			d(false)
2.2.3.4	unknownErrors	c:o		c:o		o		o			
2.2.3.5	queryReference	c:c8		c:c8		c8		c8			
2.2.4	CommonResults	m		m		m		m		*Comm-Res	See A.6.3.3.14
2.3	uncorrelatedListInfo	o		c9		–		c9			
2.4	algorithmIdentifier	–		m		–		m		*Algor-ID	See A.6.3.3.23.2
2.5	encrypted	–		m		–		m			
3	Errors	m		m		m		m			See A.6.3.3.12

c8: If [pageresreq] then support of this feature is m else o.
c9: If [CoOp-DUA, CoOp-DSA] then support of this feature is m else o.

A.6.3.3.7 Search Elements (Ref. X.511 | 9594-3, 10.2)

Prerequisite: [Search]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	SearchArgument	m		m		m		m			
1.1	toBeSigned	–		m		–		m			
1.2	baseObject	m		m		m		m			
1.3	subset	o		o		m		m			d(0)
1.4	filter	o		o		m		m		*Filter	d(and{ }), See A.6.3.3.18
1.5	searchAliases	o		o		m		m			d(true)
1.6	selection	o		o		m		m		*Info-Set	d({ }), See A.6.3.3.16
1.7	pagedResults	c8		c8		c8		c8			See A.6.3.3.20
1.8	matchedValuesOnly	o		o		c10		c10			d(false)
1.9	extendedFilter	c11		c11		c11		c11			See A.6.3.3.18
1.10	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.11	algorithmIdentifier	–		m		–		m		*Algor-ID	See A.6.3.3.23.2
1.12	encrypted	–		m		–		m			
2	SearchResult	m		m		m		m			
2.1	toBeSigned	–		m		–		m			
2.2	searchInfo	m		m		m		m			
2.2.1	name	o		o		o		o			
2.2.2	entries	m		m		m		m		*Entry-Info	See A.6.3.3.17
2.2.3	partialOutcomeQualifier	o		o		m		m			
2.2.3.1	limitProblem	c:o		c:o		o		o			
2.2.3.1.1	timeLimitExceeded	c:m		c:m		c:m		c:m			
2.2.3.1.2	sizeLimitExceeded	c:m		c:m		c:m		c:m			
2.2.3.1.3	administrativeLimitExceeded	c:m		c:m		c:m		c:m			
2.2.3.2	unexplored	c:o		c:o		o		o			See A.6.3.3.21
2.2.3.3	unavailableCriticalExtensions	c:o		c:o		m		m			d(false)
2.2.3.4	unknownErrors	c:o		c:o		o		o			
2.2.3.5	queryReference	c:c8		c:c8		c8		c8			
2.2.4	CommonResults	m		m		m		m		*Comm-Res	See A.6.3.3.14
2.3	uncorrelatedSearchInfo	o		c9		–		c9			
2.4	algorithmIdentifier	–		m		–		m		*Algor-ID	See A.6.3.3.23.2
2.5	encrypted	–		m		–		m			
3	Errors	m		m		m		m			See A.6.3.3.12

c8: If [pageresreq] then support of this feature is m else o.
c9: If [CoOp-DUA, CoOp-DSA] then support of this feature is m else o.
c10: If [matchvalonly] then support of this feature is m else o.
c11: If [extfilter] then support of this feature is m else o.

A.6.3.3.8 Add Entry Elements (Ref. X.511 | 9594-3, 11.1)

Prerequisite: [AddEntry]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	AddEntryArgument	m		m		m		m			
1.1	toBeSigned	-		m		-		m			
1.2	object	m		m		m		m			
1.3	entry	m		m		m		m			
1.4	targetSystem	c12		c12		c12		c12			See A.6.3.3.26
1.5	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.6	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
1.7	encrypted	-		m		-		m			
2	AddEntryResult	m		m		m		m			NULL (NOTE)
3	Errors	m		m		m		m			See A.6.3.3.12

c12: If [targetsystem] then support of this feature is m else o.

NOTE – Results return a NULL and cannot be signed. Implementation should return unsigned results.

A.6.3.3.9 Remove Entry Elements (Ref. X.511 | 9594-3, 11.2)

Prerequisite: [RemoveEntry]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	RemoveEntryArgument	m		m		m		m			
1.1	toBeSigned	-		m		-		m			
1.2	object	m		m		m		m			
1.3	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.4	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
1.5	encrypted	-		m		-		m			
2	RemoveEntryResult	m		m		m		m			NULL (NOTE)
3	Errors	m		m		m		m			See A.6.3.3.12

NOTE – Results return a NULL and cannot be signed. Implementation should return unsigned results.

A.6.3.3.10 Modify Entry Elements (Ref. X.511 | 9594-3, 11.3)

Prerequisite: [ModifyEntry]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	ModifyEntryArgument	m		m		m		m			
1.1	toBeSigned	-		m		-		m			
1.2	object	m		m		m		m			
1.3	changes	m		m		m		m			
1.3.1	addAttribute	m		m		m		m			
1.3.2	removeAttribute	m		m		m		m			
1.3.3	addValues	m		m		m		m			
1.3.4	removeValues	m		m		m		m			
1.4	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.5	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
1.6	encrypted	-		m		-		m			
2	ModifyEntryResult	m		m		m		m			NULL (NOTE)
3	Errors	m		m		m		m			See A.6.3.3.12

NOTE – Results return a NULL and cannot be signed. Implementation should return unsigned results.

A.6.3.3.11 ModifyDN Elements (Ref. X.511 | 9594-3, 11.4)

Prerequisite: [ModifyDN]

Item No.	Protocol Element	DUA				DSA				Predicate	Note
		Unsigned		Signed		Unsigned		Signed			
		Status	Support	Status	Support	Status	Support	Status	Support		
1	ModifyDNArgument	m		m		m		m			
1.1	toBeSigned	-		m		-		m			
1.2	object	m		m		m		m			
1.3	newRDN	m		m		m		m			
1.4	deleteOldRDN	o		o		m		m			d(false)
1.5	newSuperior	c13		c13		c13		c13			
1.6	CommonArguments	m		m		m		m		*Comm-Arg	See A.6.3.3.13
1.7	algorithmIdentifier	-		m		-		m		*Algor-ID	See A.6.3.3.23.2
1.8	encrypted	-		m		-		m			
2	ModifyDNResult	m		m		m		m			NULL (NOTE)
3	Errors	m		m		m		m			See A.6.3.3.12

c13: If [newsuperior] then support of this feature is m else o.

NOTE – Results return a NULL and cannot be signed. Implementation should return unsigned results.

A.6.3.3.12 Errors and Parameters (Ref. X.511 | 9594-3, 12)

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	Abandoned	c14		m			
2	AbandonFailed	c14		m			
2.1	problem	c:m		m			
2.1.1	noSuchOperation	c:m		m			
2.1.2	tooLate	c:m		m			
2.1.3	cannotAbandon	c:m		m			
2.2	operation	c:m		m			
3	AttributeError	c15		m			
3.1	object	c:m		m			
3.2	problems	c:m		m			
3.2.1	problem	c:m		m			
3.2.1.1	noSuchAttributeOrValue	c:m		m			
3.2.1.2	invalidAttributeSyntax	c:m		m			
3.2.1.3	undefinedAttributeType	c:m		m			
3.2.1.4	inappropriateMatching	c:m		m			
3.2.1.5	constraintViolation	c:m		m			
3.2.1.6	attributeOrValueAlreadyExists	c:m		m			
3.3	type	c:m		m			
3.4	value	c:o		o			
4	NameError	c16		m			
4.1	problem	c:m		m			
4.1.1	noSuchObject	c:m		m			
4.1.2	aliasProblem	c:m		m			
4.1.3	invalidAttributeSyntax	c:m		m			
4.1.4	aliasDereferencingProblem	c:m		m			
4.2	matched	c:m		m			
5	Referral	c16		c9			
5.1	candidate	c:m		c:m			See A.6.3.3.21
6	SecurityError	c16		m			
6.1	problem	c:m		m			
6.1.1	InappropriateAuthentication	c:m		m			
6.1.2	invalidCredentials	c:m		m			
6.1.3	insufficientAccessRights	c:m		m			
6.1.4	invalidSignature	c:c17		c17			
6.1.5	protectionRequired	c: c17		c17			
6.1.6	noInformation	c:m		m			

A.6.3.3.12 Errors and Parameters (Ref. X.511 | 9594-3, 12) (continued)

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
7	ServiceError	c16		m			
7.1	problem	c:m		m			
7.1.1	busy	c:m		m			
7.1.2	unavailable	c:m		m			
7.1.3	unwillingToPerform	c:m		m			
7.1.4	chainingRequired	c:m		m			
7.1.5	unableToProceed	c:m		m			
7.1.6	invalidReference	c:m		m			
7.1.7	timeLimitExceeded	c:m		m			
7.1.8	administrativeLimitExceeded	c:m		m			
7.1.9	loopDetected	c:m		m			
7.1.10	unavailableCriticalExtension	c:m		m			
7.1.11	outOfScope	c:m		m			
7.1.12	ditError	c:m		m			
7.1.13	invalidQueryReference	c:c18		c18			
8	UpdateError	c19		m			
8.1	problem	c:m		m			
8.1.1	namingViolation	c:m		m			
8.1.2	objectClassViolation	c:m		m			
8.1.3	notAllowedOnNonLeaf	c:m		m			
8.1.4	notAllowed OnRDN	c:m		m			
8.1.5	entryAlreadyExists	c:m		m			
8.1.6	affectsMultipleDSAs	c:m		m			
8.1.7	objectClassModificationProhibited	c:m		m			
<p>c9: If [CoOp-DUA, CoOp-DSA] then support of this feature is m else o.</p> <p>c14: If [Abandon] then support of this feature is m else o.</p> <p>c15: If [Read or Compare or Search or AddEntry or ModifyEntry] then support of this feature is m else o.</p> <p>c16: If [Read or Compare or List or Search or AddEntry or RemoveEntry or ModifyEntry or ModifyDN] then support of this feature is m else o.</p> <p>c17: If [Signed-Ops] then support of this feature is m else –.</p> <p>c18: If [pageresreq] then support of this feature is m else –.</p> <p>c19: If [AddEntry or RemoveEntry or ModifyEntry or ModifyDN] then support of this feature is m else o.</p>							

A.6.3.3.13 Common Arguments Elements (Ref. X.511 | 9594-3, 7.3)

Prerequisite: [Comm-Arg]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	serviceControls	o		m		*Serv-Ctrls	d({}), See A.6.3.3.15
2	securityParameters	c17		c17		*Sec-Param	See A.6.3.3.22
3	requestor	o		o			Note 1
4	operationProgress	o		m			d(nameResolutionPhaseNotStarted)
4.1	nameResolutionPhase	c:o		m			
4.1.1	notStarted	c:m		m			
4.1.2	proceeding	c:m		m			
4.1.3	completed	c:m		m			
4.2	nextRDNTToBeResolved	c:o		o			
5	aliasedRDNs	o		o			Note 2
6	criticalExtensions	o		m			
7	referenceType	o		o			
8	entryOnly	o		m			d(true)
9	exclusions	o		o			
10	nameResolveOnMaster	o		o			d(false)

c17: If [Signed-Ops] then support of this feature is m else –.

NOTE 1 – This parameter may be ignored unless the request is signed.

NOTE 2 – This parameter is provided for compatibility with the 1988 edition of the Directory. DUAs (and DSAs) implemented according to later editions shall always omit this parameter.

A.6.3.3.14 Common Results Elements (Ref. X.511 | 9594-3, 7.4)

Prerequisite: [Comm-Res]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	securityParameters	c17		c17		*Sec-Param	See A.6.3.3.22
2	performer	o		o			
3	aliasDereferenced	o		m			d(false)

c17: If [Signed-Ops] then support of this feature is m else –.

A.6.3.3.15 Service Controls (Ref. X.511 | 9594-3, 7.5)

Prerequisite: [Serv-Ctrls]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	options	o		m			d({})
1.1	preferChaining	c:m		m			
1.2	chainingProhibited	c:m		m			
1.3	localScope	c:m		m			
1.4	dontUseCopy	c:m		m			
1.5	dontDereferenceAliases	c:m		m			
1.6	subentries	c:m		m			
1.7	copyShallDo	c:m		m			
2	priority	o		m			d(medium)
3	timeLimit	o		o			
4	sizeLimit	o		o			
5	scopeOfReferral	o		o			
6	attributeSizeLimit	c20		c20			
c20: If [attrszelimit] then support of this feature is m else o.							

A.6.3.3.16 Entry Information Selection (Ref. X.511 | 9594-3, 7.6)

Prerequisite:[Info-Sel]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	attributes	o		m			d(allUserAttributes)
1.1	allUserAttributes	c:m		m			
1.2	select	c:m		m			
2	infoTypes	o		m			d(attributeTypesAndValues)
2.1	attributeTypesOnly	c:m		m			
2.2	attributeTypesAndValues	c:m		m			
3	extraAttributes	o		o			
3.1	allOperationalAttributes	c:m		c:m			
3.2	select	c:m		c:m			

A.6.3.3.17 Entry Information (Ref. X.511 | 9594-3, 7.7)

Prerequisite: [Entry-Info]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	name	m		m			
2	fromEntry	o		m			d(true)
3	information	o		o			
3.1	attributeType	c:m		c:m			
3.2	attribute	c:m		c:m			
4	incompleteEntry	o		m			d(false)

A.6.3.3.18 Filter Elements (Ref. X.511 | 9594-3, 7.8)

Prerequisite: [Filter or extfilter]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	item	o		m		*Filt-Item	See A.6.3.3.19
2	and	o		m			
3	or	o		m			
4	not	o		m			

A.6.3.3.19 Filter Item Elements (Ref. X.511 | 9594-3, 7.8.2)

Prerequisite: [Filt-Item]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	equality	o		m			
2	substrings	o		m			
2.1	type	c:o		m			
2.2	strings	c:o		m			
2.2.1	initial	c:o		m			
2.2.2	any	c:o		m			
2.2.3	final	c:o		m			
3	greaterOrEqual	o		m			
4	lessOrEqual	o		m			
5	present	o		m			
6	approximateMatch	o		m			
7	extensibleMatch	c11		c11			
7.1	matchingRule	c:o		c:m			
7.2	type	c:o		c:m			
7.3	matchValue	c:o		c:m			
7.4	dnAttributes	c:o		c:m			d(false)

c11: If [extfilter] then support of this feature is m else o.

A.6.3.3.20 Paged Results (Ref. X.511 | 9594-3, 7.9)

Prerequisite: [pageresreq]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	PagedResultsRequest	m		m			
1.1	newRequest	o.4		m			
1.1.1	pageSize	c:m		m			
1.1.2	sortkeys	c:o		o			
1.1.2.1	type	c:m		c:m			
1.1.2.2	orderingRule	c:o		c:o			
1.1.3	reverse	c:m		m			d(false)
1.1.4	unmerged	c:m		m			d(false)
1.2	queryReference	o.4		m			
o.4: At least one of newRequest or queryReference must be present for PagedResultsRequest.							

A.6.3.3.21 Continuation Reference (Ref. X.518 | 9594-4, 10.10)

Prerequisite: [CoOp-DUA or CoOp-DSA]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	targetObject	m		m			
2	aliasedRDNs	o		o			
3	operationProgress	m		m			
3.1	nameResolutionPhase	m		m			
3.1.1	notStarted	m		m			
3.1.2	proceeding	m		m			
3.1.3	completed	m		m			
3.2	nextRDNToBeResolved	o		m			
4	rdnsResolved	o		o			
5	referenceType	m		m			
6	accessPoints	m		m			
6.1	MasterOrShadowAccessPoint	m		m			
6.1.1	AccessPoint	m		m			
6.1.1.1	ae-title	m		m			
6.1.1.2	address	m		m			
6.1.1.2.1	pSelector	o		m			
6.1.1.2.2	sSelector	o		m			
6.1.1.2.3	tSelector	o		m			
6.1.1.2.4	nAddresses	m		m			
6.1.1.3	protocolInformation	o		o			
6.1.2	category	o		m			d(master)
6.1.2.1	master	c:m		m			
6.1.2.2	shadow	c:m		m			

A.6.3.3.21 Continuation Reference (Ref. X.518 | 9594-4, 10.10) *(continued)*

Prerequisite: [CoOp-DUA or CoOp-DSA]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
6.2	additionalPoints	o		o			
6.2.1	AccessPoint	c:m		c:m			
6.2.1.1	ae-title	c:m		c:m			
6.2.1.2	address	c:m		c:m			
6.2.1.2.1	pSelector	c:o		c:m			
6.2.1.2.2	sSelector	c:o		c:m			
6.2.1.2.3	tSelector	c:o		c:m			
6.2.1.2.4	nAddresses	c:m		c:m			
6.2.1.3	protocolInformation	c:o		c:o			
6.2.2	category	c:o		c:m			d(master)
6.2.2.1	master	c:m		c:m			
6.2.2.2	shadow	c:m		c:m			
7	entryOnly	o		m			d(false)
8	exclusions	o		o			
9	returnToDUA	o		m			d(false)
10	nameResolveOnMaster	o		c21			d(false)
c21: If [NSSR] then support of this feature is m else –.							

A.6.3.3.22 Security Parameters (Ref. X.511 | 9594-3, 7.10)

Prerequisite: [Sec-Param]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	certification-path	m		m		*Cert-Path	See A.6.3.3.23
2	name	o		o			
3	time	o		o			
4	random	o		o			
5	target	o		o			

A.6.3.3.23 CertificationPath (Ref. X.509 | 9594-8, 8)

Prerequisite: [Cert-Path]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	userCertificate	m		m			
2	theCACertificates	o		o			
2.1	forward	c:o.5		c:o.5			
2.2	reverse	c:o.5		c:o.5			
o.5: At least one of the pair shall be present as specified in clause 8 of ITU-T Rec. X.509 ISO/IEC 9594-8.							

A.6.3.3.23.1 Certificate (Ref. X.509 | 9594-8, 8)

Prerequisite: [Cert-Path]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	toBeSigned	m		m			
1.1	version	m		m			d(v1)
1.2	serialNumber	m		m			
1.3	signature	m		m			See A.6.3.3.23.2
1.4	issuer	m		m			
1.5	validity	m		m			
1.5.1	notBefore	m		m			
1.5.2	notAfter	m		m			
1.6	subject	m		m			
1.7	subjectPublicKeyInfo	m		m			
1.7.1	algorithm	m		m			
1.7.2	subjectPublicKey	m		m			
1.8	issuerUniqueIdentifier	o		o			Note
1.9	subjectUniqueIdentifier	o		o			Note
1.10	extensions	c22		c22		*Extensions	See A.6.3.3.23.3
2	algorithmIdentifier	m		m		*Algor-ID	See A.6.3.3.23.2
3	encrypted	m		m			
c22: If version 3 then support of this feature is m else o. NOTE – If present, version must be 2 or 3.							

A.6.3.3.23.2 Algorithm Identifier (Ref. X.509 | 9594-8, 8)

Prerequisite: [Algor-ID]

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

A.6.3.3.23.3 Extensions (Ref. X.509 | 9594-8, 8)

Prerequisite: [Extensions]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	extnID	m		m			
2	critical	m		m			
3	extnValue	m		m			

A.6.3.3.24 Access Control (Ref X.501 | 9594-2, 16)**A.6.3.3.24.1 Access Control Information** (Ref. X.501 | 9594-2, 16.4)

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	ACIItem	o		c23		*ACI	
1.1	identificationTag	c:m		c:m			
1.2	precedence	c:m		c:m			
1.3	authenticationLevel	c:m		c:m			
1.3.1	basicLevels	c:m		c:m			
1.3.1.1	level	c:o.6		c:m			
1.3.1.2	localQualifier	c:o.6		c:o			
1.3.2	other	i		i			
1.4	itemOrUserFirst	c:m		c:m			
1.4.1	itemFirst	c:o.7		c:m			
1.4.1.1	protectedItems	c:m		c:m			See A.6.3.3.24.2
1.4.1.2	itemPermissions	c:m		c:m			
1.4.1.2.1	precedence	c:o		c:o			d(A.6.3.3.24.1/3)
1.4.1.2.2	userClasses	c:m		c:m		*User-Class	See A.6.3.3.24.3
1.4.1.2.3	grantsAndDenials	c:m		c:m			See A.6.3.3.24.4
1.4.2	userFirst	c:o.7		c:m			
1.4.2.1	userClasses	c:m		c:m		*User-Class	See A.6.3.3.24.3
1.4.2.2	userPermissions	c:m		c:m			
1.4.2.2.1	precedence	c:o		c:o			d(A.6.3.3.24.1/3)
1.4.2.2.2	protectedItems	c:m		c:m			See A.6.3.3.24.2
1.4.2.2.3	grantsAndDenials	c:m		c:m			See A.6.3.3.24.4
o.6: At least one of level or localQualifier should be present.							
o.7: At least one of itemFirst or userFirst should be present.							
c23: If [SAC-DSA or BAC-DSA] then support of this feature is m else –.							

A.6.3.3.24.2 Protected Items [Ref. X.501 | 9594-2, 16.4.2.4 a)]

Prerequisite: [ACI]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	entry	o		o			
2	allUserAttributeTypes	o		o			
3	attributeType	o		o			
4	allAttributeValues	o		o			
5	allUserAttributeTypes&Values	o		o			
6	attributeValue	o		o			
7	selfValue	o		o			

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A.6.3.3.24.3 UserClasses [Ref. X.501 | 9594-2, 16.4.2.4 b)]

Prerequisite: [User-Class]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	allUsers	o		o			
2	thisEntry	o		o			
3	name	o		o			
4	userGroup	o		o			
5	subtree	o		o		*Subtree	See A.6.3.3.24.5

A.6.3.3.24.4 Grants and Denials (Ref. X.501 | 9594-2, 16.4.1)

Prerequisite: [ACI]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	grantAdd	o		m			
2	denyAdd	o		m			
3	grantDiscloseOnError	o		m			
4	denyDiscloseOnError	o		m			
5	grantRead	o		m			
6	denyRead	o		m			
7	grantRemove	o		m			
8	denyRemove	o		m			
9	grantBrowse	o		m			
10	denyBrowse	o		m			
11	grantExport	o		m			
12	denyExport	o		m			
13	grantImport	o		m			
14	denyImport	o		m			
15	grantModify	o		m			
16	denyModify	o		m			
17	grantRename	o		m			
18	denyRename	o		m			
19	grantReturnDN	o		m			
20	denyReturnDN	o		m			
21	grantCompare	o		m			
22	denyCompare	o		m			
23	grantFilterMatch	o		m			
24	denyFilterMatch	o		m			

A.6.3.3.24.5 Subtree Specification (Ref. X.501 | 9594-2, 11.3)

Predicate: [Subentries or Subtree]

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	base	m		m			Note 1
2	ChopSpecification	m		m			
2.1	specificExclusions	o		o			
2.1.1	chopBefore	c:m		c:m			
2.1.2	chopAfter	c:m		c:m			
2.2	minimum	m		m			Note 2
2.3	maximum	o		o			
3	specificationFilter	o		o			
3.1	item	c:m		c:m			
3.2	and	c:m		c:m			
3.3	or	c:m		c:m			
3.4	not	c:m		c:m			
NOTE 1 – At least Null set is supported.							
NOTE 2 – At least a minimum of 0 is supported.							

A.6.3.3.25 Supported References (Ref. X.501 | 9594-2, 20.2.2)

Item No.	Reference	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	Self Reference	o		o			
2	Superior Reference	o		o			
3	Immediate Superior Reference	o		o			
4	Subordinate Reference	o		o			
5	Non-Specific Subordinate Reference	o		o			
6	Cross Reference	o		o			
7	Supplier Reference	i		i			
8	Consumer Reference	i		i			

A.6.3.3.26 Access Point

Item No.	Protocol Element	DUA		DSA		Predicate	Note
		Status	Support	Status	Support		
1	AccessPoint	m		m			
1.1	ae-title	m		m			
1.2	address	m		m			
1.2.1	pSelector	o		m			
1.2.2	sSelector	o		m			
1.2.3	tSelector	o		m			
1.2.4	nAddresses	m		m			
1.3	protocolInformation	o		o			

A.6.4 Directory Schema and Directory System Schema

A.6.4.1 Supported object classes (Ref. X.521 | 9594-7)

A.6.4.1.1 Standard Object Classes

The supplier of the DSA implementation shall indicate, in the table below, the selected object classes defined in ITU-T Rec. X.521 | ISO/IEC 9594-7 for which conformance is claimed.

Item No.	Object class	DUA		DSA		Note
		Status	Support	Status	Support	
1	top	m		m		
2	alias	m		m		
3	country	o		o		
4	locality	o		o		
5	organization	o		o		
6	organizationalUnit	o		o		
7	person	o		o		
8	organizationalPerson	o		o		
9	organizationalRole	o		o		
10	groupOfNames	o		o		
11	groupOfUniqueNames	o		o		
12	residentialPerson	o		o		
13	applicationProcess	o		o		
14	applicationEntity	o		o		
15	dSA	o		o		
16	device	o		o		
17	strongAuthenticationUser	o		o		
18	certificationAuthority	o		o		

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A.6.4.1.2 Other Supported object classes

The supplier of the DSA implementation is required to list any other object classes provided for which conformance is claimed in the following table:

Index	Supported object classes	
	DUA	DSA

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A.6.4.2 Directory String Types (Ref. X.520 | 9594-6)

Item No.	Attribute Type	Upperbound	DUA		DSA		Predicate	Note
			Status	Support	Status	Support		
1	DirectoryString		m		m			
1.1	teletexString		m		m			
1.2	printableString		m		m			
1.3	BMPString		o		o		*BMP	
1.4	universalString		o		o		*UCS	

A.6.4.3 Supported Attribute Types

A.6.4.3.1 Attribute Types (Ref. X.520 | 9594-6)

The supplier of the implementation shall indicate, in the following table, the selected attribute types defined in ITU-T Rec. X.520 | ISO/IEC 9594-6 for which conformance is claimed:

Item No.	Attribute Type	Upperbound	DUA		DSA		Note
			Status	Support	Status	Support	
1	objectClass		m		m		
2	aliasedEntryName		o		o		
3	knowledgeInformation		o		o		
4	name	32768	o		o		
5	commonName	64	c24		c24		
6	surname	64	o		o		
7	givenName	32768	o		o		
8	initials	32768	o		o		
9	generationQualifier	32768	o		o		
10	uniqueIdentifier		o		o		
11	dnQualifier		o		o		
12	serialNumber	64	o		o		
13	countryName		o		o		size = 2
14	localityName	128	o		o		
15	stateOrProvinceName	128	o		o		
16	streetAddress	128	o		o		
17	houseIdentifier	64	o		o		
18	organizationName	64	o		o		
19	organizationalUnitName	64	o		o		
20	title	64	o		o		
21	description	1024	o		o		
22	searchGuide		o		o		
23	enhancedSearchGuide		o		o		
24	businessCategory	128	o		o		

A.6.4.3.1 Attribute Types (Ref. X.520 | 9594-6) (continued)

The supplier of the implementation shall indicate, in the following table, the selected attribute types defined in ITU-T Rec. X.520 | ISO/IEC 9594-6 for which conformance is claimed:

Item No.	Attribute Type	Upperbound	DUA		DSA		Note
			Status	Support	Status	Support	
25	postalAddress	6(lines) × 30(chs)	o		o		
26	postalCode	40	o		o		
27	postOfficeBox	40	o		o		
28	physicalDeliveryOfficeName	128	o		o		
29	telephoneNumber	32	o		o		
30	telexNumber	14, 4, 8	o		o		
31	teletexTerminalIdentifier	1024	o		o		
32	facsimileTelephoneNumber	32	o		o		
33	X.121 Address	15	o		o		
34	internationalISDNNumber	16	o		o		
35	registeredAddress	6(lines) × 30(chs)	o		o		
36	destinationIndicator	128	o		o		
37	preferredDeliveryMethod		o		o		
38	presentationAddress		o		o		
39	supportedApplicationContext		o		o		
40	protocolInformation		o		o		
41	distinguishedName		o		o		
42	member		o		o		
43	uniqueMember		o		o		
44	owner		o		o		
45	roleOccupant		o		o		
46	seeAlso		o		o		
47	userPassword	128	c25		c25		
48	userCertificate		c26		c26		
49	cACertificate		c26		c26		
50	authorityRevocationList		o		o		
51	certificateRevocationList		o		o		
52	crossCertificatePair		o		o		
c24: If [Subentries] then support for this attribute is m else o. c25: If [Password] then support for this attribute is m else o. c26: If [Strong-DSA] then support of this feature is m else o.							