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DATA COMMUNICATION NETWORKS

DIRECTORY ACCESS PROTOCOL – PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS)

Recommendation X.581

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation X.581 was prepared by Study Group VII and was approved under the Resolution No. 2 procedure on the 10th of September 1992.

CCITT NOTE

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

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INTRODUCTION

This Recommendation, together with the others of the series, 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 specifies the PICS Proforma for the Directory Access Protocol as defined in the 1988 X.500-Series Recommendations.

Recommendation X.581

DIRECTORY ACCESS PROTOCOL –
PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS)

(1992)

1 Scope

1.1 This Recommendation provides the PICS Proforma for the DAP specified in the 1988 X.500-Series Recommendations. This PICS Proforma is in compliance with the relevant requirements, and in accordance with the relevant guidance for PICS Proforma, given in ISO/IEC 9646-2.

1.2 Details of the use of this Proforma are provided in Annex A.

1.3 The scope of this Recommendation is the specification of the conformance statements for a Directory User Agent (DUA) and a Directory System Agent (DSA). This Proforma may be used by an implementation as either a DUA or a DSA, but not as both.

2 Normative references

- CCITT Recommendation X.500 (1988), *The Directory – Overview of Concepts, Models and Services*.
- CCITT Recommendation X.501 (1988), *The Directory – Models*.
- CCITT Recommendation X.509 (1988), *The Directory – Authentication Framework*.
- CCITT Recommendation X.511 (1988), *The Directory – Abstract Service Definition*.
- CCITT Recommendation X.518 (1988), *The Directory – Procedures for Distributed Operation*.
- CCITT Recommendation X.519 (1988), *The Directory – Protocol Specifications*.
- CCITT Recommendation X.520 (1988), *The Directory – Selected Attribute Types*.
- CCITT Recommendation X.521 (1988), *The Directory – Selected Object Classes*.

  ISO/IEC 9646-1:1991, *Information technology – Open systems interconnection – Conformance testing methodology and framework*,

  Part 1: *General concepts*. [See also CCITT Recommendation X.290 (1992)].

  ISO/IEC 9646-2:1991, *Information technology – Open systems interconnection - Conformance testing methodology and framework*,

  Part 2: *Abstract test specification*. [See also CCITT Recommendation X.291 (1992)].

3 Definitions

This Recommendation uses terms defined in 1988 X.500-Series Recommendations.

This Recommendation uses the following terms defined in ISO/IEC 9646:

- Protocol Implementation Conformance Statement (PICS);
- PICS Proforma;
- conformance;
- mandatory requirement;
- optional requirement;
- conditional requirement.

This Recommendation uses the following terms:

– **centralized DSA**: A DSA that has no knowledge of other DSAs.

– **standalone DSA**: A DSA that cannot use the Directory System Protocol, but has knowledge of other DSAs. Such DSAs use the referral procedure only.

– **co-operating DSA**: A DSA that has the capability of using the Directory System Protocol.

4 Abbreviations

Abbreviations defined in 1988 X.500-Series Recommendations are used in this Recommendation.

5 Conventions

The PICS Proforma is designed as an annex to this Recommendation.

6 Conformance

The supplier of a DAP implementation that is claimed to conform to 1988 X.500-Series Recommendations 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.

ANNEX A

(to Recommendation X.581)

Directory Access Protocol –
Protocol Implementation Conformance Statement (PICS) Proforma

(This annex forms an integral part of this Recommendation.)

Copyright release for PICS Proforma:

Users of this Recommendation may freely reproduce the PICS Proforma in this annex so that it can be used for its intended purpose and may further publish the completed PICS.

A.1 *Identification of the implementation*

A.1.1 *Identification of PICS*

Item	Question	Response
A.1.1.1	Sate of Statement (DD/MM/YY)	
A.1.1.2	PICS Serial Number	
A.1.1.3	System Conformance Statement Cross Reference	

A.1.2 *Identification of the implementation and/or system*

Item	Question	Response
A.1.2.1	Implementation Name	
A.1.2.2	Version Number	
A.1.2.3	Machine Name	
A.1.2.4	Machine Version Number	
A.1.2.5	Operating System Name	
A.1.2.6	Operating System Version No.	
A.1.2.7	Special Configuration[a)]	
A.1.2.8	Other information	

[a)] Please enter one or more of the following configurations:

- DUA for connection to centralized DSAs;
- DUA for connection to either standalone or co-operating DSAs;
- Centralized DSAs;
- Standalone DSAs;
- Co-operating DSAs;
- First-level DSAs;

A.1.3 *Identification of the system supplier and/or test laboratory client*

Item	Question	Response
A.1.3.1	Organization Name	
A.1.3.2	Contact Name (s)	
A.1.3.3	Address	
A.1.3.4	Telephone Number	
A.1.3.5	Telex Number	
A.1.3.6	Fax Number	
A.1.3.7	E-Mail Address	
A.1.3.8	Other information	

A.2 *Identification of the protocol*

Item	Question	Response
A.2.1	Title, Reference, No., publication date of the protocol standard	
A.2.2	Protocol Version Number	
A.2.3	Implemented Addenda	
A.2.4	Implemented Defect Reports (Reference No.)	

A.3 *Global statement of conformance*

If the supplied implementation is a DSA implementation, § A.3.1 is required to be answered by the supplier.

If the supplied implementation is a DUA implementation, § A.3.2 is required to be answered by the supplier.

Answering "No" to items A.3.1.1 or A.3.2.1 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.6.5, "Other information".

A.3.1 *DSA implementation and/or system*

Item	Question	D	I
A.3.1.1	Are all mandatory general capabilities for the DSA implemented?	m	[ ]
A.3.1.2	Are minimum knowledge requirements (Rec. X.518) implemented?	c (Note 1)	[ ]
A.3.1.3	Are all mandatory First-level DSA requirements (Rec. X.518) implemented?	c (Note 2)	[ ]
A.3.1.4	Is Cross Reference implemented?	o	[ ]
A.3.1.5	Is NSSR (non-specific subordinate reference)	o	[ ]
A.3.1.6	Supported Security Level(s)	None, simple, strong	( )
A.3.1.7	Is asynchronous (ROSE class 2) mode of operation supported?	m	[ ]
A.3.1.8	Is the alias mechanism implemented?	o	[ ]

A.3.2 *DUA implementation and/or system – General capabilities*

Item	Question	D	I
A.3.2.1	Are all mandatory general capabilities for the DUA implemented?	m	[ ]
A.3.2.2	Supported Security Level(s)	None, simple, strong	( )
A.3.2.3	Is asynchronous (ROSE class 2) mode of operation supported?	o	[ ]

A.4 *Instruction for completing the PICS Proforma*

A.4.1 *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 requires that capability explicitly);
- 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 also, 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 its 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 a subset or all aspects of the attribute syntax of the attribute and stores the attribute value(s) where appropriate.

A.4.2 *D (Defined) column*

This column indicates the level of support required for conformance to the CCITT Recommendation.

The values are as follows:

m Mandatory support is required.

o Optional support is permitted for conformance to the Recommendation. If implemented it must conform to the specifications and restrictions contained in the Recommendation. These restrictions may affect the optionality of other items.

c The item is conditional (support of the capability is subject to a predicate).

– The item is not applicable.

The D(DUA) indicates that the implementation under the IUT is a DUA and the D(DSA) indicates that the implementation under the IUT is a DSA.

A.4.3 *I (Implemented) column*

This column shall be completed by the supplier or implementor, when either a [ ] or a ( ), to indicate the level of implementation of each item. The Proforma has been designed such that values required in [ ] are

Y yes, the item has been implemented;

N no, the item has not been implemented;

– the item is not applicable;

and values in ( ) are

T strong authentication is supported;

S simple authentication is supported;

N no authentication is supported.

In the PICS Proforma tables, every leading item marked "m" shall be supported by the IUT. Sub-items marked "m" shall be supported if the corresponding leading item is supported by the IUT.

All entries within the PICS Proforma shall be made in ink. Alterations to such entries shall be made by crossing out, not erasing nor making the original entry illegible, and writing the new entry alongside. All such alterations to records shall be initialized by the staff making them.

A.4.4 *Note column*

This column indicates the following:

notexx Refers to Note xx.

pxx Refers to predicate pxx.

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

A.4.5 *Item reference numbers*

Each line within the PICS Proforma which requires implementation details to be entered 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 labelled 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 the item A.6.3.1.1.2, which refers to the support for credentials in a DirectoryBind protocol data unit.

A.4.6 *Predicate definitions*

If the classification of an Element of Service (EOS) or a Protocol Element (PEL) is subject to a predicate support of the item, it is mandatory if the related predicate is true. Otherwise support of the item is optional.

p10: true if the supported security level in item A3.2.2 indicates either "S" (simple) or "T" (strong);

p11: true if the supported security level in item A.3.2.2 indicates "S" (simple);

p12: true for a DSA if the supported security level in item A.3.1.6 indicates "T" (strong); true for a DUA if the supported security level in item A.3.2.2 indicates "T" (strong);

p13: true for a DSA if the supported security level in item A.3.1.6 indicates either "S"(simple) or "T" (strong); p10 for a DUA;

p14: true for a DSA if the supported security level in item A.3.1.6 indicates "S" (simple); p11 for a DUA;

p30: true if item A.1.2.7 indicates that the DSA is a co-operating DSA;

p50: true for a DUA if the Abandon operation is implemented (see § A.6.2);

p51: true for a DUA if at least one of the following operations is implemented (see § A.6.2): Read/Compare/Search/AddEntry/ModifyEntry;

p52: true for a DUA if at least one of the following operations is implemented (see § A.6.2): Read/Compare/List/Search/AddEntry/RemoveEntry/ModifyEntry/ModifyRDN;

p53: true for a DUA if at least one of the following operations is implemented (see § A.6.2); AddEntry/RemoveEntry/ModifyEntry/ModifyRDN;

p90: true if the IUT is a DSA.

A.5 *Abbreviations*

The following abbreviations are used in this PICS Proforma:

c conditional;

D Defined;

d default;

I Implemented;

m mandatory;

n no Authentication;

N/A Not Applicable;

o optional;

Y Yes.

A.6 *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.6.1 *Supported application context*

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

A.6.2 *Operations*

Item	Operation	D (DUA)	D (DSA)	I	Note	Reference
A.6.2.1	Directory Bind	m	m	[ ]		§ A.6.3.1
A.6.2.2	Directory UnBind	m	m	[ ]		§ A.6.3.2
A.6.2.3	Read	o	m	[ ]	(Notes 1, 2)	§ A.6.3.3
A.6.2.4	Compare	o	m	[ ]	(Note 1)	§ A.6.3.4
A.6.2.5	Abandon	o	m	[ ]	(Note 3)	§ A.6.3.5
A.6.2.6	List	o	m	[ ]	(Notes 1, 2)	§ A.6.3.6
A.6.2.7	Search	o	m	[ ]	(Notes 1, 2)	§ A.6.3.7
A.6.2.8	AddEntry	o	m	[ ]	(Note 1)	§ A.6.3.8
A.6.2.9	RemoveEntry	o	m	[ ]	(Note 1)	§ A.6.3.9
A.6.2.10	ModifyEntry	o	m	[ ]	(Note 1)	§ A.6.3.10
A.6.2.11	ModifyRDN	o	m	[ ]	(Note 1)	§ A.6.3.11

Note1 – This Note applies to the DUA implementation only. If the supported security level in item A.3.2.2 indicates "T" (strong), then conformance requires support of the signed form of the arguments for the operations.

Note 2 – This Note applies to the DSA implementation only. If the supported security level in item A.3.1.6 indicates "T" (strong), then conformance requires support for the signed form of the results for this operation.

Note 3 – If the Abandon operation can only be supported if the asynchronous mode (ROSE class 2) of operation is supported in items A.3.1.7 or A.3.2.3.

A.6.3 *Protocol elements*

A.6.3.1 *DirectoryBind Protocol Elements*

A.6.3.1.1 *DirectoryBind Arguments*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.1.1.1	Directory BindArg	m	m	[ ]		§ 8.1 (Rec. X.511)
A.6.3.1.1.2	credentials	c	c	[ ]	p10	
A.6.3.1.1.3	simple	c	c	[ ]	p11	
A.6.3.1.1.4	name	m	m	[ ]		
A.6.3.1.1.5	validity	o	o	[ ]		
A.6.3.1.1.6	password	o	o	[ ]		
A.6.3.1.1.7	strong	c	c	[ ]	p12	
A.6.3.1.1.8	externalProcedure	o	o	[ ]		
A.6.3.1.1.9	versions	m	m	[ ]	d(v1988)	

A.6.3.1.2 *DirectoryBind Result*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.1.2.1	Directory BindResult	m	m	[ ]		§ 8.1 (Rec. X.511)
A.6.3.1.2.2	credentials	c	c	[ ]	p13	
A.6.3.1.2.3	simple	c	c	[ ]	p14	
A.6.3.1.2.4	name	m	m	[ ]		
A.6.3.1.2.5	validity	o	o	[ ]		
A.6.3.1.2.6	password	o	o	[ ]		
A.6.3.1.2.7	strong	c	c	[ ]	p12	
A.6.3.1.2.8	ExternalProcedure	o	o	[ ]		
A.6.3.1.2.9	versions	m	m	[ ]	d(v1988)	

A.6.3.1.3 *DirectoryBindError*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.1.3.1	Directory BindError	m	m	[ ]		§ 8.1 (Rec. X.511)
A.6.3.1.3.2	versions	m	m	[ ]	d(v1988)	
A.6.3.1.2.3	ServiceProblem	m	m	[ ]		
A.6.3.1.3.4	SecurityProblem	m	m	[ ]		

A.6.3.2 *DirectoryUnbind Elements*

DirectoryUnbind has no arguments (see § 8.2 of Recommendation X.511).

A.6.3.3 *Read Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.3.1	ReadArgument	m	m	[ ]		§ 9.1 (Rec. X.511)
A.6.3.3.2	object	m	m	[ ]		
A.6.3.3.3	selection	m	m	[ ]		§ A.6.3.16
A.6.3.3.4	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.3.5	ReadResult	m	m	[ ]		
A.6.3.3.6	entry	m	m	[ ]		§ A.6.3.1.7
A.6.3.3.7	CommonResults	m	m	[ ]		§ A.6.3.14

A.6.3.4 *Compare Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.4.1	CompareArgument	m	m	[ ]		§ 9.2 (Rec. X.511)
A.6.3.4.2	object	m	m	[ ]		
A.6.3.4.3	purported	m	m	[ ]		
A.6.3.4.4	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.4.5	CompareResult	m	m	[ ]		§ 9.2 (Rec. X.511)
A.6.3.4.6	DistinguishedName	m	m	[ ]		
A.6.3.4.7	matched	m	m	[ ]		
A.6.3.4.8	fromEntry	m	m	[ ]	d(true)	
A.6.3.4.9	CommonResults	m	m	[ ]		§ A.6.3.14

A.6.3.5 *Abandon Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.5.1	AbandonArgument	m	m	[ ]		§ 9.3 (Rec. X.511)
A.6.3.5.2	invoked	m	m	[ ]		
A.6.3.5.3	AbandonResult	m	m	[ ]		

A.6.3.6 *List Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.6.1	ListArgument	m	m	[ ]		§ 10.1 (Rec. X.511)
A.6.3.6.2	objected	m	m	[ ]		
A.6.3.6.3	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.6.4	ListResult	m	m	[ ]		
A.6.3.6.5	listInfo	m	m	[ ]		
A.6.3.6.6	DistinguishedName	o	m	[ ]		
A.6.3.6.7	subordinates	m	m	[ ]		
A.6.3.6.8	RDN	m	m	[ ]		
A.6.3.6.9	aliasEntry	m	m	[ ]	d(false)	
A.6.3.6.10	fromEntry	m	m	[ ]	d(true)	
A.6.3.6.11	partialOutcomeQualifier	o	m	[ ]		
A.6.3.6.12	limitProblem	o	o	[ ]		
A.6.3.6.13	unexplored	o	c	[ ]	p30	§ A.6.3.20
A.6.3.6.14	unavailableCriticalExt	m	m	[ ]		
A.6.3.6.15	CommonResults	m	m	[ ]		§ A.6.3.14
A.6.3.6.16	uncorrelatedListInfo	o	c	[ ]	p12	item A.6.3.6.4

A.6.3.7 *Search Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.7.1	SearchArgument	m	m	[ ]		§ 10.2 (Rec. X.511)
A.6.3.7.2	baseObject	m	m	[ ]		
A.6.3.7.3	subset	m	m	[ ]	d(0)	
A.6.3.7.4	filter	o	m	[ ]	d(and{})	§ A.6.3.8
A.6.3.7.5	searchAliases	m	m	[ ]	d(true)	
A.6.3.7.6	selection	o	m	[ ]	d({})	§ A.6.3.16
A.6.3.7.7	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.7.8	SearchResult	m	m	[ ]		§ 10.2 (Rec. X.511)
A.6.3.7.9	searchInfo	m	m	[ ]		
A.6.3.7.10	DistinguishedName	o	m	[ ]		
A.6.3.7.11	entries	m	m	[ ]		§ A.6.3.17
A.6.3.7.12	PartialOutcomQuaf	o	m	[ ]		Item A.6.3.6.11
A.6.3.7.13	CommonResults	m	m	[ ]		§ A.6.3.14
A.6.3.7.14	uncorrelatedSearchInfo	o	c	[ ]	p12	Item A.6.3.7.8

A.6.3.8 *AddEntry Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.8.1	AddEntryArgument	m	m	[ ]		§ 11.1 (Rec. X.511)
A.6.3.8.2	object	m	m	[ ]		
A.6.3.8.3	entry	m	m	[ ]		§ A.6.3.17
A.6.3.8.4	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.8 5	AddEntryResult	m	m	[ ]		§ 11.1 (Rec. X.511)

A.6.3.9 *RemoveEntry Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.9.1	RemoveEntryArgument	m	m	[ ]		§ 11.2 (Rec. X.511)
A.6.3.9.2	object	m	m	[ ]		
A.6.3.9.3	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.9.4	RemoveEntryResult	m	m	[ ]		

A.6.3.10 *ModifyEntry Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.10.1	ModifyEntryArgument	m	m	[ ]		§ 11.3 (Rec. X.511)
A.6.3.10.2	object	m	m	[ ]		
A.6.3.10.3	changes	m	m	[ ]		
A.6.3.10.4	addAttribute	m	m	[ ]		
A.6.3.10.5	removeAttribute	m	m	[ ]		
A.6.3.10.6	addValues	m	m	[ ]		
A.6.3.10.7	removeValues	m	m	[ ]		
A.6.3.10.8	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.10.9	ModifyEntryResult	m	m	[ ]		§ 11.3 (Rec. X.511)

A.6.3.11 *ModifyRDN Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.11.1	ModifyRDNArgument	m	m	[ ]		§ 11.4 (Rec. X.511)
A.6.3.11.2	object	m	m	[ ]		
A.6.3.11.3	newRDN	m	m	[ ]		
A.6.3.11.4	deleteOldRDN	m	m	[ ]	d(false)	
A.6.3.11.5	CommonArguments	o	m	[ ]		§ A.6.3.13
A.6.3.11.6	ModifyRDNResult	m	m	[ ]		§ 11.4 (Rec. X.511)

A.6.3.12 *Errors and Parameters*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.12.1	Abandoned	c	m	[ ]	p50	§ 12.2 (Rec.X 511)
A.6.3.12.2	AbandonFailed	c	m	[ ]	p50	§ 12.3 (Rec.X. 511)
A.6.3.12.3	problem	m	m	[ ]		
A.6.3.12.4	operation	c	m	[ ]		
A.6.3.12.5	AttributeError	m	m	[ ]	p51	§ 12.4 (Rec.X. 511)
A.6.3.12.6	object	m	m	[ ]		
A.6.3.12.7	problems	m	m	[ ]		
A.6.3.12.8	problem	m	m	[ ]		
A.6.3.12.9	type	m	m	[ ]		
A.6.3.12.10	value	m	m	[ ]		
A.6.3.12.11	NameError	c	m	[ ]	p52	§ 12.5 (Rec.X. 511)
A.6.3.12.12	problem	m	m	[ ]		
A.6.3.12.13	matched	m	m	[ ]		
A.6.3.12.14	Referral	c	m	[ ]	p52	§ 12.6 (Rec.X. 511)
A.6.3.12.15	candidate	m	m	[ ]		§ A.6.3.20
A.6.3.12.16	SecurityError	c	m	[ ]	p52	§ 12.7 (Rec.X. 511)
A.6.3.12.17	problem	m	m	[ ]		
A.6.3.12.18	ServiceError	c	m	[ ]	p52	§ 12.8 (Rec.X. 511)
A.6.3.12.19	problem	m	m	[ ]		
A.6.3.12.20	UpdateError	c	m	[ ]	p53	§ 12.9 (Rec.X. 511)
A.6.3.12.21	problem	m	m	[ ]		

A.6.3.13 *CommonArguments Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.13.1	ServiceControls	o	m	[ ]	d({})	§ A.6.3.15
A.6.3.13.2	SecurityParameters	o	c	[ ]	p12 d({})	
A.6.3.13.3	certification-path	o	m	[ ]		
A.6.3.13.4	name	o	m	[ ]		
A.6.3.13.5	time	o	m	[ ]		
A.6.3.13.6	random	o	m	[ ]		
A.6.3.13.7	target	o	o	[ ]		
A.6.3.13.8	requestor	o	m	[ ]		
A.6.3.13.9	OperationProgress	o	m	[ ]	d(notStarted)	
A.6.3.13.10	nameResolutionPhase	o	m	[ ]	d(notStarted)	
A.6.3.13.11	nextRDNToBeResolved	o	m	[ ]		
A.6.3.13.12	aliasedRDNs	o	m	[ ]		
A.6.3.13.13	extensions	o	m			

A.6.3.14 *CommonResults Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.14.1	SecurityParameters	c	c	[ ]	p12	
A.6.3.14.2	certification-path	o	o	[ ]		
A.6.3.14.3	name	o	o	[ ]		
A.6.3.14.4	time	m	m	[ ]		
A.6.3.14.5	random	m	m	[ ]		
A.6.3.14.6	target	–	–	[ ]		
A.6.3.14.7	performer	m	m	[ ]		
A.6.3.14.8	aliasDereferenced	m	m	[ ]	d(false)	

A.6.3.15 *Service Controls*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.15.1	ServiceControls	o	m	[ ]		§ 7.5 (Rec. X.511)
A.6.3.15.2	options	o	m	[ ]	d({})	
A.6.3.15.3	priority	o	m	[ ]		
A.6.3.15.4	timeLimit	o	m	[ ]		
A.6.3.15.5	sizeLimit	o	m	[ ]		
A.6.3.15.6	scopeOfReferral	o	c	[ ]	p30	

A.6.3.16 *Entry Information Selection*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.16.1	EntryInformationSelection	o	m	[ ]		§ 7.6 (Rec. X.511)
A.6.3.16.2	attributeTypes	o	m	[ ]		
A.6.3.16.3	allAttributes	o	m	[ ]		
A.6.3.16.4	select	o	m	[ ]		
A.6.3.16.5	infoTypes	o	m	[ ]	d(1)	

A.6.3.17 *Entry Information*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.17.1	EntryInformation	m	m	[ ]		§ 7.7 (Rec. X.511)
A.6.3.17.2	DistinguishedName	m	m	[ ]		
A.6.3.17.3	fromEntry	m	m	[ ]	d(True)	
A.6.3.17.4	<attributeset>	m	m	[ ]	(Note 1)	
A.6.3.17.5	AttributeType	m	m	[ ]		
A.6.3.17.6	Attribute	m	m	[ ]		

Note – The <attributeset> denotes the SET OF CHOICE ASN.1 construction.

A.6.3.18 *Filter Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.18.1	item	o	m	[ ]		§ A.6.3.19
A.6.3.18.2	and	o	m	[ ]		
A.6.3.18.3	or	o	m	[ ]		
A.6.3.18.4	not	o	m	[ ]		

A.6.3.19 *Filter item Elements*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.19.1	equality	o	m	[ ]		
A.6.3.19.2	substrings	o	m	[ ]		
A.6.3.19.3	type	o	m	[ ]		
A.6.3.19.4	strings	o	m	[ ]		
A.6.3.19.5	initial	o	m	[ ]		
A.6.3.19.6	any	o	m	[ ]		
A.6.3.19.7	final	o	m	[ ]		
A.6.3.19.8	greaterOrEqual	o	m	[ ]		
A.6.3.19.9	lessOrEqual	o	m	[ ]		
A.6.3.19.10	present	o	m	[ ]		
A.6.3.19.11	approximateMatch	o	m	[ ]		

A.6.3.20 *Continuation reference*

Item	Protocol Element	D (DUA)	D (DSA)	I	Note	Reference
A.6.3.20.1	targetObject	o	m	[ ]		
A.6.3.20.2	aliasedRDNs	o	m	[ ]		
A.6.3.20.3	OperationProgress	o	m	[ ]		
A.6.3.20.4	nameResolutionPhase	o	m	[ ]		
A.6.3.20.5	nextRDNTToBeResolved	o	m	[ ]		
A.6.3.20.6	rdnsResolved	o	m	[ ]		
A.6.3.20.7	AccessPoint	o	m	[ ]		
A.6.3.20.8	Name	o	m	[ ]		
A.6.3.20.9	PresentationAddress	o	m	[ ]		
A.6.3.20.10	pSelector	o	m	[ ]		
A.6.3.20.11	sSelector	o	m	[ ]		
A.6.3.20.12	tSelector	o	m	[ ]		
A.6.3.20.13	nSelector	o	m	[ ]		

A.6.4 *Directory schema*

A.6.4.1 *Supported object classes*

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 Recommendation X.521 for which conformance is claimed. The supplier of the DUA implementation need not complete the following table:

Item	Objet class	D	I	Note
A.6.4.1.1.1	top	m	[ ]	
A.6.4.1.1.2	alias	m	[ ]	
A.6.4.1.1.3	country	o	[ ]	
A.6.4.1.1.4	locality	o	[ ]	
A.6.4.1.1.5	organization	o	[ ]	
A.6.4.1.1.6	organizationalUnit	o	[ ]	
A.6.4.1.1.7	person	o	[ ]	
A.6.4.1.1.8	organizationalPerson	o	[ ]	
A.6.4.1.1.9	organizationalRole	o	[ ]	
A.6.4.1.1.10	groupOfName	o	[ ]	
A.6.4.1.1.11	residentialPerson	o	[ ]	
A.6.4.1.1.12	applicationProcess	o	[ ]	
A.6.4.1.1.13	applicationEntity	o	[ ]	
A.6.4.1.1.14	dSA	m	[ ]	
A.6.4.1.1.15	device	o	[ ]	
A.6.4.1.1.16	strongAuthenticationUser	o	[ ]	
A.6.4.1.1.17	certificationAuthority	o	[ ]	

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

A.6.4.2 *Supported Attribute Types*

A.6.4.2.1 *Standard Attribute Types*

The supplier of the implementation shall indicate, in the following table, the selected attribute types defined in Recommendation X.520 for which conformance is claimed:

Item	Attribute Type	D	I	Upper bound	Note
A.6.4.2.1.0	objectClass	c	[ ]		p90
A.6.4.2.1.1	aliasedObjectName	o	[ ]		
A.6.4.2.1.2	knowledgeInformation	o	[ ]		
A.6.4.2.1.3	commonName	o	[ ]	64	
A.6.4.2.1.4	surname	o	[ ]	64	
A.6.4.2.1.5	serialNumber	o	[ ]	64	
A.6.4.2.1.6	countryName	o	[ ]		size = 2
A.6.4.2.1.7	localityName	o	[ ]	128	
A.6.4.2.1.8	stateOrProvinceName	o	[ ]	128	
A.6.4.2.1.9	streetAddress	o	[ ]	128	
A.6.4.2.1.10	organizationName	o	[ ]	64	
A.6.4.2.1.11	organizationalUnitName	o	[ ]	64	
A.6.4.2.1.12	title	o	[ ]	64	
A.6.4.2.1.13	description	o	[ ]	1024	
A.6.4.2.1.14	searchGuide	o	[ ]		
A.6.4.2.1.15	businessCategory	o	[ ]	128	
A.6.4.2.1.16	postalAddress	o	[ ]	6(lines) × 30(chs)	
A.6.4.2.1.17	postalCode	o	[ ]	40	
A.6.4.2.1.18	postOfficeBox	o	[ ]	40	
A.6.4.2.1.19	physicalDeliveryOfficeNa	o	[ ]	128	
A.6.4.2.1.20	telephoneNumber	o	[ ]	32	
A.6.4.2.1.21	telexNumber	o	[ ]	14, 4, 8	
A.6.4.2.1.22	teletexTerminalIdentifier	o	[ ]	24	
A.6.4.2.1.23	facsimilTelephoneNumb	o	[ ]	32	
A.6.4.2.1.24	X.121Address	o	[ ]	15	
A.6.4.2.1.25	internationalISDNNumber	o	[ ]	16	
A.6.4.2.1.26	registeredAddress	o	[ ]	6(lines) × 30(chs)	
A.6.4.2.1.27	destinationIndicator	o	[ ]	128	
A.6.4.2.1.28	preferredDeliveryMethod	o	[ ]		
A.6.4.2.1.29	presentationAddress	o	[ ]		
A.6.4.2.1.30	supportedApplicationCont	o	[ ]		
A.6.4.2.1.31	member	o	[ ]		
A.6.4.2.1.32	owner	o	[ ]		
A.6.4.2.1.33	roleOccupant	o	[ ]		
A.6.4.2.1.34	seeAlso	o	[ ]		
A.6.4.2.1.35	userPassword	o	[ ]	128	

A.6.4.2.1.36	userCertificate	o	[ ]		
A.6.4.2.1.37	cACertificate	o	[ ]		
A.6.4.2.1.38	authorityRevocationList	o	[ ]		
A.6.4.2.1.39	certificateRevocationList	o	[ ]		
A.6.4.2.1.40	crossCertificatePair	o	[ ]		

A.6.4.2.2 *Other Supported Attribute Types*

The supplier of the implementation shall list any other attribute types provided for which conformance is claimed in the following table:

Index	Attribute Types

A.6.5 *Other information*

The following table can be used to provide any other relevant information:

Index	Other information

A.7 *Multi-layer dependencies*

A.7.1 *Upper layers*

Not Applicable.

A.7.2 *Underlying layers*

The Directory Access Protocol is defined in the Directory Access Application Context that implies the modifications shown in the following tables to the referenced elements within the appropriate PICS Proforma:

A.7.2.1 *ROSE (Recommendation X.249)*

PICS reference	DUA	DSA
A.2.2	N/A	N/A
A.3.2	N/A	N/A
A.14.2	N/A	N/A
A.15.2	N/A	N/A

A.7.2.2 *ACSE (ISO/IEC DIS 8650-2)*

PICS reference	DUA	DSA
A.7.1	m	m
A.7.2	N/A	N/A
A.8.1	m	N/A
A:8.2	N/A	m