INTERNATIONAL STANDARDIZED PROFILE

ISO/IEC ISP 10615-4

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Information technology — International Standardized Profiles ADInn — OSI Directory —

Part 4:
ADI22 — DSA Invoker Role

Technologies de l'information — Profils normalisés internationaux ADInn — L'Annuaire —

Partie 4: ADI22 — Rôle d'invocateur du DSA

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Contents

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 JTC1. In addition to developing International Standards, ISO/IEC JTC1 has created a Special Group on Functional Standardization for the elaboration of International Standardized Profiles.

An International Standardized Profile is an internationally agreed, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or a set of functions.

Draft International Standardized Profiles are circulated to national bodies for voting. Publication as an International Standardized Profile requires approval by at least 75 % of the national bodies casting a vote.

International Standardized Profile ISO/IEC ISP 10615-4 was prepared with the collaboration of

- Asia-Oceania Workshop (AOW);
- European Workshop for Open Systems (EWOS);
- Open Systems Environment Implementors' Workshop (OIW).

ISO/IEC ISP 10615 consists of the following parts, under the general title *Information technology - International Standardized Profiles ADInn - OSI Directory*:

- *Part 3:ADI21 - DSA Performer Role*
- *Part 4:ADI22 - DSA Invoker Role*

Annexes A and B form an integral part of this part of ISO/IEC ISP 10615.

Introduction

This part of ISO/IEC ISP 10615 is defined within the context of Functional Standardization, in accordance with the principles specified by ISO/IEC TR 10000, "Framework and Taxonomy of International Standardized Profiles". The context of Functional Standardization is one part of the overall field of Information Technology (IT) standardization activities, covering base standards, profiles, and registration mechanisms. A profile defines a combination of base standards that collectively perform a specific well-defined IT function. Profiles standardize the use of options and other variations in the base standards, and provide a basis for the development of uniform, internationally recognized system tests.

One of the most important roles for an ISP is to serve as the basis for the development (by organizations other than ISO and IEC) of internationally recognized test methods. ISPs are produced not simply to "legitimize" a particular choice of base standards and options, but to promote real system interoperability. The development and widespread acceptance of tests based on this and other ISPs is crucial to the successful realization of this goal.

The text of this part of ISO/IEC ISP 10615 was developed in close co-operation among the Directory Expert Groups of the three International OSI Workshops: OSE Implementors Workshop (OIW), the European Workshop for Open Systems (EWOS) and the OSI Asia-Oceania Workshop (AOW). This part of ISO/IEC ISP 10615 is harmonized among these three Workshops and it was finally ratified by the Workshops' plenary assemblies.

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Information technology — International Standardized Profiles ADInn — OSI Directory —

Part 4:
ADI22 — DSA Invoker Role

1 Scope

1.1 General

This part of ISO/IEC ISP 10615 covers the DSP invoker functions, in which a DSA chains a request and receives a result or an error. The related part of the ISP, ADI32, covers the behaviour of the DSA in fulfilling distributed operations, when considered to be independent of the protocol used.

The objective of ISO/IEC ISP 10615-4 is to define capabilities and constraints on support for DSP by invoker functions of DSAs so that DSAs will be able to interwork within the Directory. Factors outside the scope of ISO/IEC ISP 10615-4 include, but are not limited to, DIT structure, behaviour in distributed operations and some aspects of authentication (e.g., simple authentication with protected passwords, strong authentication, and the use of non-local authentication information).

DSAs that do not support the distributed directory are outside the scope of ISO/IEC ISP 10615.

The scope of ISO/IEC ISP 10615 is limited to the '88 edition of the Directory standards.

1.2 Position Within the Taxonomy

This part of ISO/IEC ISP 10615 is identified in ISO/IEC TR 10000-2 as "ADI22 - DSA invoker Role".

It may be combined with other parts of ISO/IEC ISP 10615, with ISO/IEC ISP 10616 specifying use of the directory, and with T-Profiles specifying the OSI connection-mode transport service.

1.3 Scenario

The model used is described in Overview of Concepts, Models, and Services in [ISO/IEC 9594-1 | CCITT X.500]. Specifications of ISO/IEC ISP 10615-4 apply to the invoker role of DSP for a DSA within the scenario of Figure 1.

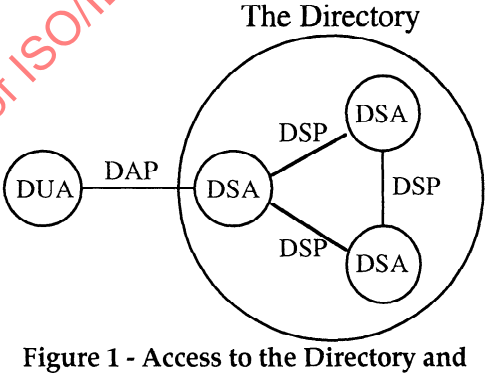

Figure 1 - Access to the Directory and Distributed Directory Model

2 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 10615. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this part of ISO/IEC ISP 10615 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and ITU-T maintains published editions of its current Recommendations.

ISO/IEC 2022 : 1994, *Information technology - Character code structure and extension techniques.*
ISO 3166 : 1993, *Codes for the representation of names of countries.*

ISO/IEC 8824 : 1990, *Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).* (See also CCITT Recommendation X.208:1988.)

ISO/IEC 8825 : 1990, *Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)* (See also CCITT Recommendation X.209:1988.)

ISO/IEC 9594-1 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 1 : Overview of concepts, models, and services.* (See also CCITT Recommendation X.500:1989.)

ISO/IEC 9594-2 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 2 : Models.*(See also CCITT Recommendation X.501:1989.)

ISO/IEC 9594-3 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 3 : Abstract Service Definition.*(See also CCITT Recommendation X.511:1989.)

ISO/IEC 9594-4 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 4 : Procedures for distributed operation.* (See also CCITT Recommendation X.518:1989.)

ISO/IEC 9594-5 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 5: Protocol specifications.* (See also CCITT Recommendation X.519:1989.)

ISO/IEC 9594-6 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 6 : Selected attribute types.* (See also CCITT Recommendation X.520:1989).

ISO/IEC 9594-7 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 7 : Selected object classes.* (See also CCITT Recommendation X.521:1989.)

ISO/IEC 9594-8 : 1990, *Information technology - Open Systems Interconnection - The Directory - Part 8 : Authentication framework.* (See also CCITT Recommendation X.509:1989.)

ISO/IEC 9646-1 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1 : General concepts.* (See also ITU-T Recommendation X.290:1995.)

ISO/IEC 9646-2 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2 : Abstract Test Suite specification.*(See also ITU-T Recommendation X.291:1991.)

ISO/IEC TR 10000-1 : 1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1 : General Principles and documentation framework.*

ISO/IEC TR 10000-2 : 1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 2 : Principles and Taxonomy for OSI profiles.*

CCITT Recommendation T.61:1988, *Character Repertoire and Coded Character Sets for the International Teletex Service.*

CCITT Recommendation X.581:1992, *Directory Access Protocol - Protocol Implementation Conformance Statement (PICS) Proforma.*

CCITT Recommendation X.582:1992, *Directory System Protocol - Protocol Implementation Conformance Statement (PICS) Proforma.*

3 Definitions

For the purposes of this part of ISO/IEC ISP 10615, the following definitions apply.

Terms used in this part of ISO/IEC ISP 10615 are defined in the referenced base standards.

In addition, the following terms are defined.

3.1 General

3.1.1 APDU size (for sending/receiving): the size of the sent/received transfer encoding, including the ROSE header.

3.1.2 supported (for reception by an initiator): A feature (capability, result, error or protocol element) is supported for reception by an initiator if the implementation is able to process the feature in accordance with the base standard and this part of ISO/IEC ISP 10615 to accomplish the function assosiated by the base standard with that feature. If a protocol element is claimed to be supported, the full

range of values shall be supported, unless stated otherwise.

3.1.3 supported (for sending by an initiator): A feature (capability, operation or protocol element) is supported for sending by an initiator if the implementation is able to generate the feature for chaining a request from a DUA or another DSA in order to complete it in accordance with the base standard and this part of ISO/IEC ISP 10615.

3.2 Support level

To specify the support level of protocol features for this part of ISO/IEC ISP 10615, the following terminology is defined in 3.2.1 through 3.2.5.

3.2.1 mandatory (requirement to support); m : Support for the item is required.

3.2.2 optional (requirement to support); o : Support for the item is optional.

3.2.3 conditional (requirement to support); c : The requirement to support the item depends on the specified condition. The condition and the resulting support requirements are stated separately, usually via reference based on a number following the 'c'.

3.2.4 outside the scope (requirement to support); i : Support for the item is outside the scope of this part of ISO/IEC ISP 10615.

3.2.5 not applicable (requirement to support); - : The item is not defined in the context where it is mentioned. There is no support requirement. The occurrence of "not applicable" is mainly due to the format of the tables in the ISPICS Requirements List.

4 Abbreviations

For the purposes of this part of ISO/IEC ISP 10615, the following abbreviations apply.

Abbreviations used in this part of ISO/IEC ISP 10615 are defined in the referenced base standards.

ACSE	Association Control Service Element
APDU	Application Protocol Data Unit
AVA	Attribute Value Assertion
DAP	Directory Access Protocol
DIB	Directory Information Base
DIT	Directory Information Tree
DSA	Directory System Agent
DSP	Directory System Protocol
DUA	Directory User Agent
IPRL	ISPICS Requirements List
ISP	International Standardized Profile
ISPICS	ISP Implementation Conformance Statement
PICS	Protocol Implementation Conformance Statement
RDN	Relative Distinguished Name
ROSE	Remote Operations Service Element
SPDU	Session Protocol Data Unit
SSDU	Session Service Data Unit

5 Conformance

This part of ISO/IEC ISP 10615 states requirements upon implementations for the purpose of achieving interworking. A claim of conformance to this part of ISO/IEC ISP 10615 is a claim that all requirements in the relevant base standards are satisfied, and that all requirements in the following clauses and in annex A of this part of ISO/IEC ISP 10615 are satisfied. Annex A states the relationship between these requirements and those of the base standards.

To conform to this part of ISO/IEC ISP 10615, implementations shall conform to all requirements of 9.2 in ISO/IEC 9594-5 for a DSA implementing the directorySystemAC application context, including the requirements directly and indirectly referenced by that clause. A DSA claiming conformance to this part of ISO/IEC ISP 10615 shall satisfy the requirements specified in 5.1 through 5.3 following.

5.1 Conformance Statement

For each implementation claiming conformance to this part of ISO/IEC ISP 10615 , an appropriate set of PICSs shall be produced stating support or non-support of each option identified in this part of ISO/IEC ISP 10615. The PICS shall conform to 9.2.1 in ISO/IEC 9594-5, and to the IPRL, annex A of this part of ISO/IEC ISP 10615.

5.2 Static Conformance Requirements

To conform to this part of ISO/IEC ISP 10615, implementations shall conform to all requirements of 9.2.2 in [ISO/IEC 9594-5 | X.519] for a DSA supporting the directorySystemAC application context, and shall conform to the requirements stated in the IPRL (Annex A) and the remainder of 5.2 of this part of ISO/IEC ISP 10615.

Note: In the IPRL defined in annex A of this part of ISO/IEC ISP 10615, where protocol elements are nested, the requirement to support the nested element is relevant only when the immediately containing protocol element is supported. The conformance requirement of the protocol elements at the highest level is of relevance only when the related operation is supported.

5.2.1 APDU Size

Implementations shall be capable of accepting and processing response APDUs of any size up to 262 143 (256k-1) octets in length and shall be capable of sending request APDUs of any size up to 32 767 (32k-1) octets in length.

Note : See also 5.3.1, APDU Size Constraints.

5.2.2 Security Level

Implementations shall be able to carry out the peer entity authentication of DSAs by the following ways:

- none
- simple authentication with unprotected password

The following method of peer entity authentication is option.

- simple authentication without password

Note 1 - The following ways of authentication are out of scope of this part of ISO/IEC ISP 10615.

-simple authentication with protected password
-strong authentication
-external authentication Procedure

Note 2 - Originator authentication of DUAs and results authentication are out of scope of this part of ISO/IEC ISP 10615.

5.3 Dynamic Conformance Requirements

To conform to this part of ISO/IEC ISP 10615, implementations shall conform to all requirements of 9.2.3 and 7.5 in [ISO/IEC 9594-5 | X.519] for a DSA supporting the directorySystemAC application context. Implementations shall conform to all procedures specified in the directory base standards as amended by the corrigenda listed in annex B of this part of ISO/IEC ISP 10615. Implementations shall support all procedures and capabilities in the directory base standards as they relate to operations and protocol elements for which support is claimed in the PICS.

Note - A chaining DSA must propagate both supported and non-supported protocol elements in chained operations and chained responses as specified by the directory base standards.

5.3.1 APDU Size Constraints

When an oversize response APDU is received or oversize request APDU would be sent, it may be discarded, in which case an appropriate error (i.e., ServiceError "unwillingToPerform" or "administrativeLimitExceeded") should be returned.

NOTES
1: A DSA may be operated with administrative limits on APDU size lower than those specified in the static conformance requirements. The possible effects on distributed operations should be considered in establishing such limits.

2: This part of ISO/IEC ISP 10615 does not place an upper bound on the size of APDUs that a DSA is permitted to send or received. However, it is recommended that it is possible to configure a DSA to not send (generate or propagate) a request APDU in excess of 32 767 (32k-1) octets in length, except to DSAs that are known to be capable of receiving APDUs of the size being sent.

3: This part of ISO/IEC ISP 10615 does not impose constraints on the actions of the supporting layers upon receiving response APDUs in excess of 262 143 (256k-1) octets in length.

4: See also 5.2.1, APDU Size.

5.3.2 Rules of Extensibility for Result and Error Handling

Implementaions shall satisfy the rule of extensibility for result and error handling specified in 7.5.2.5 and 7.5.2.6 of ISO/IEC 9594-5:Cor.1:1992(E).

5.3.3 Digital Signatures

Chaining DSAs shall accept and return signed chained operations and responses on behalf of other DSAs, but they need not be capable of evaluating the signature.

Annex A
(normative)
ISPICS Requirements List(IPRL)

In the event of a discrepancy becoming apparent in the body of this part of ISO/IEC ISP 10615 and the tables in this annex, this annex is to take precedence.

A.1 Introduction

The tables of this annex specify the level of support for each feature of the DSP protocol, as required by this part of ISO/IEC ISP 10615.

The abbreviations as used in the heading of the tables in this annex are:

D - conformance requirement as defined in the base standard

P - conformance requirement for this part of ISO/IEC ISP 10615.

Section 1: Identification of the Implementation

A.2 Identification of the Implementation

A.2.1 Identification of PICS

(Void)

A.2.2 Identification of the implementation and/or system

Item No.	Question	Response
1	Implementation Name	(Void)
2	Version Number	(Void)
3	Machine Name	(Void)
4	Machine Version Number	(Void)
5	Operating System Name	(Void)
6	Operating System Version No.	(Void)
7	Special Configuration	non-First-Level DSA or First-Level DSA
8	Other Information	(Void)

A.2.3 Identification of the system supplier and/or test laboratory client

(Void)

Section 2: General Specification

A.3 Identification of the Protocol

1	Protocol Standard	ISO/IEC 9594:1989:Information technology - Open Systems Interconnection - The Directory
2	Protocol Version	Version 1
3	Implemented Addenda	None
4	Implemented Defect Reports	See Annex B

A.4 Global Statement of Conformance

Answering "No" to A.4.1 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-conforming.

Item No	Question	D	P
1	Are all mandatory general capabilities implemented?	m	m
2	Are minimum knowledge requirements (ISO/IEC 9594-4:1990) implemented?	m	m
3	Are all mandatory First-level DSA requirements (ISO/IEC 9594-4:1990) implemented?	c01	c01
4	Is Cross Reference implemented?	o	i
5	Is NSSR (non-specific subordinate reference) implemented?	o	i
6	Is security level "none" for peer entity authentication supported?	o.1	m
7	Is security level "simple without password" for peer entiry authentication supported?	o.1	o
8	Is security level "simple with unprotected password" for peer authentication supported?	o.1	m
9	Is security level "simple with protected password" for peer authentication supported?	o.1	i
10	Is security level "strong" for peer entity authentication supported?	o.1	i
11	Is security level "none" for originator authentication supported?	o.2	o.12
12	Is security level "simple with distinguished name" for originator authentication supported?	o.2	o.12
13	Is security level "strong" for originator authentication supported?	o.2	i
14	Is security level "none" for results authentication supported?	o.3	m
15	Is security level "strong" for results authentication supported?	o.3	i
16	Is "DSA Referral Mode" supported?	m	m
17	Is "Chaining Mode" supported?	o	m
18	Is the alias mechanism implemented?	o	i

o.1: At least one of Security Levels for peer entity authentication shall be supported.
o.2: At least one of Security Levels for originator authentication shall be supported.
o.3: At least one of Security Levels for results authentication shall be supported.
o.12: At least one of Security Levels for originator authentication shall be supported.
c01: if the special configuration in A.2.2.7 is First-level DSA then m else -.

Section 3: Capabilities and Options

A.5 Capabilities and Options

A.5.1 Supported Application Context

1	The only application context supported by this part of ISO/IEC ISP 10615 is Directory System Application Context defined in ISO/IEC 9594-5.

A.5.2 Operations

Item No	Operation	Reference	D	P
1	DSABind	A.5.3.1	m	m
2	DSAUnbind	A.5.3.2	m	m
3	ChainedRead	A.5.3.3	m	m
4	ChainedCompare	A.5.3.4	m	m
5	ChainedAbandon	A.5.3.5	m	m
6	ChainedList	A.5.3.6	m	m
7	ChainedSearch	A.5.3.7	m	m
8	ChainedAddEntry	A.5.3.8	m	m
9	ChainedRemoveEntry	A.5.3.9	m	m
10	ChainedModifyEntry	A.5.3.10	m	m
11	ChainedModifyRDN	A.5.3.11	m	m

A.5.3 Protocol Elements

A.5.3.1 DSABind Protocol Elements

A.5.3.1.1 DSABind Arguments

Item No	Protocol Element/Parameter	Reference	Sending		Receiving		Supported Values or Notes
			D	P	D	P	
1	DirectoryBindArgument		m	m	m	m	
2	credentials		c10	m	c10	m	
3	simple		c11	m	c11	m	
4	name		m	m	m	m	
5	validity		o	i	o	i	
6	password		o	m	o	m	
7	strong		c12	i	c12	i	
8	externalProcedure		o	i	o	i	
9	versions		m	m	m	m	v1988(0)

c10: if at least one of answers to A.4.7, A.4.8, A.4.9 and A.4.10 is "Yes" then m else o.
c11: if at least one of answers to A.4.7, A.4.8 and A.4.9 is "Yes" then m else o.
c12: if answer to A.4.10 is "Yes" then m else o.

A.5.3.1.2 DSABind Result

Item No	Protocol Element/Parameter	Reference	Sending		Receiving		Supported Values or Notes
			D	P	D	P	
1	DirectoryBindResult		m	m	m	m	
2	credentials		c10	m	c10	m	
3	simple		c11	m	c11	m	
4	name		m	m	m	m	
5	validity		o	i	o	i	
6	password		o	m	o	m	
7	strong		c12	i	c12	i	
8	externalProcedure		o	i	o	i	
9	versions		m	m	m	m	v1988(0)

A.5.3.1.3 DSABind Error

Item No	Protocol Element/Parameter	Reference	Sending		Receiving		Supported (Note 1) values or Notes
			D	P	D	P	
1	DirectoryBindError		m	m	m	m	
2	versions		m	m	m	m	v1988(0) (Note 2)
3	serviceError		m	m	m	m	unavailable
4	securityError		m	m	m	m	inappropriate- Authentication invalidCredentials

Note 1: Only the specified values shall be supported, except as noted.
Note 2: When indicating directory bind error, DSA may indicate versions that it supports other than those within the scope of this part of ISO/IEC ISP 10615.

A.5.3.2 DSAUnbind Protocol Element

DSAUnbind has no arguments(refer clause 13.2 in ISO/IEC 9594-4).

A.5.3.3 ChainedRead Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	ReadArgument		m	m	
3	object		m	m	
4	selection	A.5.3.16	m	m	
5	CommonArguments	A.5.3.13	m	m	
6	ChainingResults	A.5.3.22	m	m	
7	ReadResult		m	m	
8	entry	A.5.3.17	m	m	
9	CommonResults	A.5.3.14	m	m	

A.5.3.4 ChainedCompare Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	CompareArgument		m	m	
3	object		m	m	
4	purported		m	m	
5	CommonArguments	A.5.3.13	m	m	
6	ChainingResults	A.5.3.22	m	m	
7	CompareResult		m	m	
8	DistinguishedName		m	m	
9	matched		m	m	
10	fromEntry		m	m	
11	CommonResults	A.5.3.14	m	m	

A.5.3.5 ChainedAbandon Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	AbandonArgument		m	m	
3	invokedId		m	m	
4	ChainingResults	A.5.3.22	m	m	
5	AbandonResult		m	m	

A.5.3.6 ChainedList Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	ListArgument		m	m	
3	object		m	m	
4	CommonArguments	A.5.3.13	m	m	
5	ChainingResults	A.5.3.22	m	m	
6	ListResult		m	m	
7	listInfo		m	m	
8	DistinguishedName		m	m	
9	subordinates		m	m	
10	RelativeDistinguishedName		m	m	
11	aliasEntry		m	m	
12	fromEntry		m	m	
13	partialOutcomeQualifier		m	m	
14	limitProblem		m	m	
15	unexplored	A.5.3.20	m	m	
16	unavailableCriticalExtensions		m	m	
17	CommonResults	A.5.3.14	m	m	
18	uncorrelatedListInfo	A.5.3.6.6	m	m	

A.5.3.7 ChainedSearch Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	SearchArgument		m	m	
3	baseObject		m	m	
4	subset		m	m	
5	filter	A.5.3.18	m	m	
6	searchAliases		m	m	
7	selection	A.5.3.16	m	m	
8	CommonArguments	A.5.3.13	m	m	
9	ChainingResults	A.5.3.22	m	m	
10	SearchResult		m	m	
11	searchInfo		m	m	
12	DistinguishedName		m	m	
13	entries	A.5.3.17	m	m	
14	partialOutcomeQualifier	A.5.3.6.13	m	m	
15	CommonResults	A.5.3.14	m	m	
16	uncorrelatedSearchInfo	A.5.3.7.10	m	m	

A.5.3.8 ChainedAddEntry Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	AddEntryArgument		m	m	
3	object		m	m	
4	entry		m	m	
5	CommonArguments	A.5.3.13	m	m	
6	ChainingResults	A.5.3.22	m	m	
7	AddEntryResult		m	m	

A.5.3.9 ChainedRemoveEntry Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	RemoveEntryArgument		m	m	
3	object		m	m	
4	CommonArguments	A.5.3.13	m	m	
5	ChainingResults	A.5.3.22	m	m	
6	RemoveEntryResult		m	m	

A.5.3.10 ChainedModifyEntry Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	ModifyEntryArgument		m	m	
3	object		m	m	
4	changes		m	m	
5	addAttribute		m	m	
6	removeAttribute		m	m	
7	addValues		m	m	
8	removeValues		m	m	
9	CommonArguments	A.5.3.13	m	m	
10	ChainingResults	A.5.3.22	m	m	
11	ModifyEntryResult		m	m	

A.5.3.11 ChainedModifyRDN Protocol Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ChainingArguments	A.5.3.21	m	m	
2	ModifyRDNArgument		m	m	
3	object		m	m	
4	newRDN		m	m	
5	deleteOldRDN		m	m	
9	CommonArguments	A.5.3.13	m	m	
10	ChainingResults	A.5.3.22	m	m	
11	ModifyRDNResult		m	m	

A.5.3.12 Errors and Parameters

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	Abandoned		m	m	
2	AbandonFailed		m	m	
3	problem		m	m	
4	operation		m	m	
5	AttributeError		m	m	
6	object		m	m	
7	problems		m	m	
8	problem		m	m	
9	type		m	m	
10	value		m	m	
11	NameError		m	m	
12	problem		m	m	
13	matched		m	m	
14	DSAReferral		m	m	
15	ContinuationReference	A.5.3.20	m	m	
16	contextPrefix		m	m	
17	SecurityError		m	m	
18	problem		m	m	
19	ServiceError		m	m	
20	problem		m	m	
21	UpdateError		m	m	
22	problem		m	m	

A.5.3.13 Common Arguments Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	ServiceControls	A.5.3.15	m	m	
2	SecurityParameters		c13	i	
3	requestor		o	i	
4	OperationProgress		m	m	
5	nameResolutionPhase		m	m	
6	nextRDNToBeResolved		m	m	
7	aliasedRDNs		m	m	
8	criticalExtensions		o	m	

c13: if answer to A.4.13 is "Yes" then m else o.

A.5.3.14 Common Results Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	SecurityParameters		c14	i	
2	performer		o	i	
3	aliasDereferenced		m	m	

c14: if answer to A.4.15 is "Yes" then m else o.

A.5.3.15 Service Controls

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	options		m	m	
2	priority		m	m	
3	timeLimit		m	m	
4	sizeLimit		m	m	
5	scopeOfReferral		m	m	

A.5.3.16 Entry Information Selection

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	attributeTypes		m	m	
2	allAttributes		m	m	
3	select		m	m	
4	infoTypes		m	m	

A.5.3.17 Entry Information

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	DistinguishedName		m	m	
2	fromEntry		m	m	
3	SET OF CHOICE		m	m	
4	AttributeType		m	m	
5	Attribute		m	m	

A.5.3.18 Filter Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	item	A.5.3.19	m	m	
2	and	A.5.3.18	m	m	
3	or	A.5.3.18	m	m	
4	not	A.5.3.18	m	m	

A.5.3.19 Filter Item Elements

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	equality		m	m	
2	substrings		m	m	
3	type		m	m	
4	strings		m	m	
5	initial		m	m	
6	any		m	m	
7	final		m	m	
8	greaterOrEqual		m	m	
9	lessOrEqual		m	m	
10	present		m	m	
11	approximateMatch		m	m	

A.5.3.20 Continuation Reference

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	targetObject		m	m	
2	aliasedRDNs		m	m	
3	operationProgress		m	m	
4	nameResolutionPhase		m	m	
5	nextRDNToBeResolved		m	m	
6	rdnsResolved		m	m	
7	referenceType		m	m	
8	accessPoints		m	m	
9	ae-title		m	m	
10	address		m	m	
11	entryOnly		m	m	

A.5.3.21 Chaining Arguments

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	originator		m	m	
2	targetObject		m	m	
3	operationProgress		m	m	
4	nameResolutionPhase		m	m	
5	nextRDNToBeResolved		m	m	
6	traceInformation	A.5.3.24	m	m	
7	aliasDereferenced		m	m	
8	aliasedRDNs		m	m	
9	entryOnly		m	m	
10	returnCrossRefs		m	m	
11	referenceType		m	m	
12	info		o	i	
13	timeLimit		m	m	
14	SecurityParameters		c13	i	

A.5.3.22 Chaining Results

Item No	Protocol Element/Parameter	Reference	Invoker		Supported Values or Notes
			D	P	
1	info		m	m	
2	crossReferences	A.5.3.23	m	m	
3	SecurityParameters		c14	i	