

INTERNATIONAL STANDARDIZED PROFILE

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Part 6: ADI32 — DSA Support for Distributed Operations

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Partie 6: ADI32 — Support DSA d'opérations réparties



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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. In addition to developing International Standards, ISO/IEC JTC 1 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 10615-6 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 1: ADI11 — DUA Support of Directory Access*
- *Part 2: ADI12 — DSA Support of Directory Access*
- *Part 3: ADI21 — DSA Performer Role*
- *Part 4: ADI22 — DSA Invoker Role*
- *Part 5: ADI31 — DUA Support for Distributed Operations*
- *Part 6: ADI32 — DSA Support for Distributed Operations*
- *Part 7: ADI41 — Specific Digital Signature Schemes*
- *Part 8: ADI4X — Use of Strong Authentication*

Annexes A and B form an integral part of this part of ISO/IEC ISP 10615. Annexes C and D are for information only.

Introduction

The concept and structure of International Standardized Profiles for Information Systems are laid down in the Technical Report ISO/IEC TR 10000. The purpose of an International Standardized Profile is to recommend when and how certain information technology standards shall be used. This International Standardized Profile ISO/IEC ISP 10615-6 specifies application profile ADI32 "DSA Support of Distributed Operations" as defined in the Technical Report ISO/IEC TR 10000-2.

This profile has been derived by EWOS/ETSI as editing workshop from the corresponding European profile A/DI32, published by EWOS as ED 024, and published by CEN as ENV 41215.

It has been reviewed in the process of development by AOW/INTAP, by OIW and by EWOS/ETSI, and changes have been made to accommodate comments from these other workshops.

Information technology — International Standardized Profiles

ADInn — OSI Directory —

Part 6:

ADI32 — DSA Support for Distributed Operations

1 Scope

1.1 General

The Directory Standards define not only the protocol but also the behaviour of DSAs when they collaborate to carry out the purpose of the Directory. In order to achieve consistency and full interoperability, it is necessary to select from the options and interpretations laid down in the Directory Standards, and in particular within [ISO/IEC 9594-4 | CCITT X.518].

This part of ISO/IEC ISP 10615 specifies the behaviour of DSAs in exercising the DAP, the DSP, or both, that is required to carry out Distributed Operations in accordance with these requirements.

The scope of this part of ISO/IEC ISP 10615 is to define:

- Static capabilities that are required by DSAs in order to achieve acceptable levels of service in co-operation with other DSAs
- Procedures, based on procedures given within the base standards, in the detail required to achieve consistency and interoperability
- Protocol use, as required to implement the procedures

It is applicable to DSAs implementing the '88 Directory Standards [ISO/IEC 9594:1990 | CCITT X.500:1988].

It applies to all DSAs that contain a component of the distributed Directory, although many of its requirements are inapplicable to DSAs that do not support the invocation of DSP operations.

Implementations claiming conformance to this part of ISO/IEC ISP 10615 may be based on either ISO/IEC 9594 or CCITT X.500 or both. There are no practical differences as far as this part of ISO/IEC ISP 10615 is concerned.

This part of ISO/IEC ISP 10615 is not free-standing. Compliance with this part of ISO/IEC ISP 10615 requires compliance with ISO/IEC ISP 10615 parts 2 to 4 inclusive, and with normative references identified in those documents. Conversely, this part of the part of ISO/IEC ISP 10615 is applicable to DSAs which conform to other parts of ISO/IEC ISP 10615, and in particular to parts 2 (ADI12), 3 (ADI21) and 4 (ADI22).

1.2 Position within the taxonomy

This part of ISO/IEC ISP 10615 is identified in ISO/IEC TR 10000-2 as ADI32 "Directory - Distributed Operations - DSA Support of Distributed Operations".

1.3 Scenario

In the Distributed Directory, one mode of interaction is the chaining (including multicasting) of enquiries in accordance with the procedures laid down in [ISO/IEC 9594-4 | CCITT X.518]. Another is the following of referrals and of embedded continuation references.

In carrying out these procedures, a DSA is accessed by a DUA or another DSA, and carries out the requested action with or without reference to other DSAs. This part of ISO/IEC ISP 10615 is concerned with

the information contained in a DSA to enable it to determine that other DSAs are involved, and with the procedures whereby other DSAs can be involved, by the use of chaining or referrals (Figure 1).

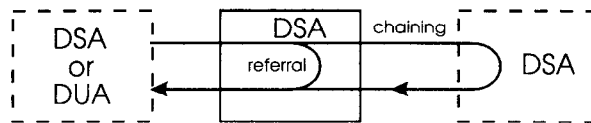


Figure 1-DNA Behaviour for Distributed Operations

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.

2.1 Paired CCITT Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.208:1988, *Data Communications – Open Systems Interconnection (OSI) – Specification of Abstract Syntax Notation One (ASN.1)*.
ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1)*.
- CCITT Recommendation X.209:1988, *Data Communications – Open Systems Interconnection (OSI) – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.
ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.
- CCITT Recommendation X.219:1988, *Data Communications – Open Systems Interconnection (OSI) – Remote Operations: Model, notation and service definition*.
ISO/IEC 9072-1:1989, *Information processing systems – Text communication – Remote Operations – Part 1: Model, notation and service definition*.
- CCITT Recommendation X.229:1988, *Data Communications – Open Systems Interconnection (OSI) – Remote Operations: Protocol Specification*.
ISO/IEC 9072-2:1989, *Information processing systems – Text communication – Remote Operations – Part 2: Protocol specification*.
- CCITT Recommendation X.500:1988, *Data Communication Networks – The Directory – Overview of Concepts, Models and Services*.
ISO/IEC 9594-1:1990, *Information technology – Open Systems Interconnection – The Directory – Part 1: Overview of concepts, models and services*.
- CCITT Recommendation X.501:1988, *Data Communication Networks – The Directory – Models*.
ISO/IEC 9594-2:1990, *Information technology – Open Systems Interconnection – The Directory – Part 2: Models*.
- CCITT Recommendation X.509:1988, *Data Communication Networks – The Directory – Authentication Framework*.

- ISO/IEC 9594-8:1990, *Information technology – Open Systems Interconnection – The Directory – Part 8: Authentication framework.*
- CCITT Recommendation X.511:1988, *Data Communication Networks – The Directory – Abstract Service Definition.*
- ISO/IEC 9594-3:1990, *Information technology – Open Systems Interconnection – The Directory – Part 3: Abstract service definition.*
- CCITT Recommendation X.518:1988, *Data Communication Networks – The Directory – Procedures for Distributed Operation.*
- ISO/IEC 9594-4:1990, *Information technology – Open Systems Interconnection – The Directory – Part 4: Procedures for distributed operation.*
- CCITT Recommendation X.519:1988, *Data Communication Networks – The Directory – Protocol Specifications.*
- ISO/IEC 9594-5:1990, *Information technology – Open Systems Interconnection – The Directory – Part 5: Protocol specifications.*
- CCITT Recommendation X.520:1988, *Data Communication Networks – The Directory – Selected Attribute Types.*
- ISO/IEC 9594-6:1990, *Information technology – Open Systems Interconnection – The Directory – Part 6: Selected attribute types.*

2.2 Normative Amendments and Technical Corrigenda

In accordance with ISO/IEC TR10000-1 subclause 6.3.2 c), attention is drawn to normative Amendments and Technical Corrigenda affecting the Directory Standards documents ISO/IEC 9594:1990 and the CCITT X.500:1988 recommendations.

Annex B defines the references to the agreed amendments and corrigenda. Compliance with these amendments and corrigenda is necessary to achieve the interoperability requirements for this document. It also identifies those which appear to be relevant to this part of ISO/IEC ISP 10615.

2.3 Additional normative references

- 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 10000-2:1992, *Information technology-Framework and Taxonomy of International Standardized Profiles - Part 2: Principles and taxonomy for OSI profiles.*
- ISO/IEC ISP 10616-1:1995 *Information technology - International Standardized Profile FDI11 - Directory data definitions - Common Directory Use (Normal)*
- ISO/IEC ISP 11188-1:1995 *Information technology - International Standardized Profile - Common upper layer requirements - Part 1: Basic connection oriented requirements*
- 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

3.1 General

Many of the definitions used may be found in the referenced base standards. Since not all of the definitions are to be found in the Definitions clauses within the standards documents, references are listed in Table 1

below. The "Part" reference refers to the part number within ISO/IEC 9594 or its CCITT equivalent (see also Clause 2).

Table 1: Definitions and references

Term	Part	Reference
Administrative authority	2	5.1.3
Continuation reference	4	12.9
Cross reference	4	3.5.3
Evaluation Phase	4	17.2
First Level DSA	4	10.2
Internal reference	4	3.5.6
List (I) Procedure	4	18.7.2.1.1
List (II) Procedure	4	18.7.2.1.2
Name Resolution Phase	4	12.5.2.1
Naming context	4	3.5.12 ¹
Non-specific subordinate reference	4	3.5.13
Partial Outcome Qualifier	3	10.1.3.3
Presentation address	6	5.9.1
Referral	4	3.5.16
Results Merging Phase	4	17.2.3
Root Context	4	3.5.18
Search (I) Procedure	4	18.7.2.2.1
Search (II) Procedure	4	18.7.2.2.2
Subordinate reference	4	3.5.19
Superior reference	4	3.5.21

The terms in the following subclauses are defined for the purposes of this part of ISO/IEC ISP 10615.

- a) *Caching*: The process of creating cache copies of entries or part of an entries whose consistency with the corresponding source entries is maintained by local means;
- d) *Replication*: The process by which copies of entry and operational information are held by DSAs other than the master DSA;
- e) *Shadowing*: Replication between two DSAs whereby the information is copied and maintained using a suitable Directory Information Shadowing Protocol;
- f) *Find Naming Context procedure*: The procedure specified by [ISO/IEC 9594-4 | CCITT X.518] clause 18.6.5 and illustrated in Figure 8 of that document.
- g) *Local Name Resolution procedure*: The procedure specified by [ISO/IEC 9594-4 | CCITT X.518] clause 18.6.6 and illustrated in Figure 9 of that document.
- h) *Object Evaluation procedure*: The procedure specified by [ISO/IEC 9594-4 | CCITT X.518] clause 18.7.
- i) *Results Merging procedure*: The procedure specified by [ISO/IEC 9594-4 | CCITT X.518] clause 18.8.
- j) *Operation Performing Cycle*: An element of processing within a single DSA which includes a single Find Naming Context procedure with Local Name Resolution procedure as appropriate, together with

¹Reference should be made to the corrigendum (ISO/IEC 9594-4: 1988/COR 2 1992(E)) , which redefines this item.

any associated Operation Evaluation procedures and Results Merging procedures; each alias encountered typically generates a separate Operation Performing Cycle.

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.

3.2.1 Mandatory: m: Mandatory requirement for support

A feature is supported by a DSA implementation if the DSA is able to process the feature in accordance with the base standard or as specified in this part of ISO/IEC ISP 10615.

3.2.2 Optional: o: Optional requirement for support

The support of the feature is left to the implementor of the DSA.

3.2.3 Conditional: c: Conditional requirement for support

The requirement to support the item depends on a specified condition. The condition and the resulting support requirements are stated separately.

4 Abbreviations

The following abbreviations are used as defined in [ISO/IEC 9594 | CCITT X.500] or in ISO/IEC TR 10000-1 :

APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation One
AVA	Attribute Value Assertion
DAP	Directory Access Protocol
DIB	Directory Information Base
DIT	Directory Information Tree
DMD	Directory Management Domain
DSA	Directory System Agent
DSP	Directory System Protocol
DUA	Directory User Agent
ISP	International Standardized Profile
NSSR	Non-Specific Subordinate Reference
POQ	Partial outcome qualifier
PRL	Profile Requirements List
RDN	Relative Distinguished Name

5 Conformance

Conformance to this part of ISO/IEC ISP 10615 concerns the implementation of procedures which DSAs shall support. The compliance of a DSA with these procedures shall be capable of being tested by setting up suitable test suites, which, however, shall observe only the externally observable behaviour of the DSA. The conformance statements of this part of ISO/IEC ISP 10615 lay down the range of information for suitable DSA test suites.

In practice, the behaviour of an actual DSA may depend on multiple conditions, like access control, or schema or other restrictions applied for administrative reasons. Therefore test suites, even if applicable in principle, cannot be performed successfully in all situations. A DSA is conformant according to this part of ISO/IEC ISP 10615 if the DSA, after suitable set-up, is able to successfully carry out test suites within the range of information defined in this part of ISO/IEC ISP 10615.

NOTE. Suitable set-up is implied within this part of ISO/IEC ISP 10615.

DSAs claiming conformance to this part of ISO/IEC ISP 10615 shall satisfy the basic conformance requirement for distributed operations defined in [ISO/IEC 9594-5 | CCITT X.519] in clause 9.2.3; corresponding to each operation invoked by a requestor, performing DSAs shall behave in accordance with well-defined procedures so that an appropriate response will be returned deterministically.

Conformance requirements relating to this part of ISO/IEC ISP 10615 which lie outside standards requirements are listed in clause A.7 of Annex A.

6 Static conformance requirements

To conform to this part of ISO/IEC ISP 10615, implementations shall conform to all requirements of clause 9.2.2 of [ISO/IEC 9594-5 | CCITT X.519], and also to requirements identified in clause 18.1 of [ISO/IEC 9594-4 | CCITT X.518]; they shall conform to the requirements stated in the IPRL (Annex A) and to the remainder of this clause.

6.1 Elements of Distributed Operations

6.1.1 Reference Types

This part of ISO/IEC ISP 10615 requires conforming implementations to be able to hold and use reference types as summarised in Table 2 below.

Table 2: Reference Types

Reference types	Holding and using capability	Notes
Superior	Mandatory	Non-first-level DSAs shall hold precisely one single Superior Reference. All DSAs shall be capable of acting as a non-first-level DSA, and so are required to support a Superior Reference.
Subordinate	Mandatory	
Cross-reference	Optional	Support of Cross References may be required for particular configurations of DSA.
Non-specific Subordinate	Optional	

A DSA conformant to this part of ISO/IEC ISP 10615 shall be capable of holding and using a (single) Superior Reference.

DSAs conformant with this part of ISO/IEC ISP 10615 may optionally be able to hold and use Cross References.

NOTES.

- 1
- [ISO/IEC 9594-4 | CCITT X.518] and this part of ISO/IEC ISP 10615 do not define any standardised procedures for creating, updating and deleting references or naming contexts.
- 2
- A Cross Reference may be or become incorrect, or it may be temporarily or permanently unusable. No procedure is defined to handle these situations, which should nevertheless be taken into account in the design of DSAs.
- 3
- There is currently no established mechanism whereby a DUA (or DSA) that receives an invalid reference from a DSA can advise that DSA of the fact, so that rectification can take place.

6.1.2 Knowledge References And the Root Context

6.1.2.1 The Root Context

The root context as held by a First Level DSA consists of the Root and a number of Subordinate References to Naming Contexts held (as master copies) by the DSA and by other First Level DSAs. It comprises full knowledge of the naming contexts immediately subordinate to the root of the DIT.

The Directory standards require that the whole of the root context is replicated to and held by each First Level DSA. The procedures for accomplishing this replication are not standardised.

NOTE. See also [ISO/IEC 9594-4 | X.518] clause 10.2 for a more comprehensive statement of requirements.

6.1.2.2 First-Level DSAs

The concept of First-Level DSAs has been defined with a view to permitting centralisation of the Directory knowledge information needed for international interworking and navigation within a single country.

A DSA conformant to this part of ISO/IEC ISP 10615 and capable of acting as a First Level DSA shall be able to hold and use the Root Context and in addition shall hold as master (i.e. have administrative authority for) at least one Naming Context immediately subordinate to the root of the DIT. A DSA conforming to this part of ISO/IEC ISP 10615 is not, however, required to have the capability of being a First Level DSA.

There is no mandatory requirement for DSAs capable of acting as first-level DSAs to support Non-specific Subordinate References within the root context even if they claim to support Non-specific Subordinate References generally.

NOTE. If the root context contains a Non-specific Subordinate References, DSAs have potentially to multicast the operation to each other first-level DSA to determine whether the entry's first RDN exists.

6.1.2.3 Subordinate References

DSAs conformant to this part of ISO/IEC ISP 10615 shall be able to hold Naming Contexts which use Subordinate References.

DSAs shall be able to hold multiple subordinate references subordinate to a single entry in the DIT (Figure 2).

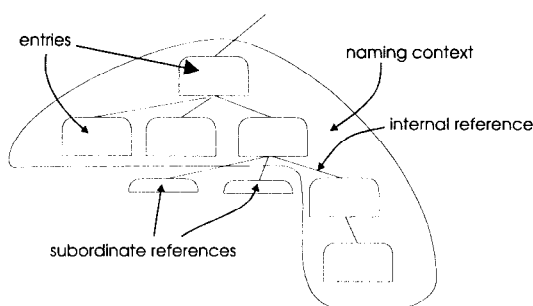


Figure 2—Support of subordinate references

DSAs shall also be able to hold local entries (accessible by internal reference) subordinate to an entry that is the immediate superior of a subordinate reference.

6.1.2.4 Non-Specific Subordinate References

DSAs conformant to this part of ISO/IEC ISP 10615 may optionally be able to hold Naming Contexts which use Non-Specific Subordinate References (NSSRs).

DSAs that support NSSRs shall be able to hold multiple Non-specific Subordinate References subordinate to a single entry in the DIT (Figure 3).

DSAs that support NSSRs shall be able to hold subordinate references and internal references subordinate to the entry associated with each NSSR.

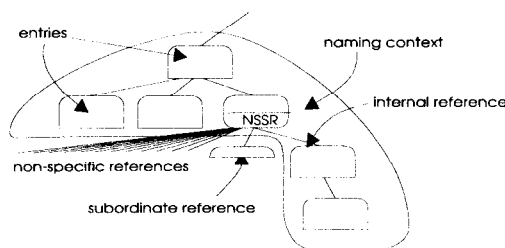


Figure 3—Support of NSSRs

6.1.2.5 Return-Cross-References

The support of the "return-cross-references" facility by the generation of protocol from internally stored information, either as requester or as supplier, as defined in [ISO/IEC 9594-4 | CCITT X.518] clause 10.4.1 is optional. (Support of the protocol elements itself, e.g. to relay cross-references, is mandatory - see **returnCrossRefs** in Table A.4.3.2.1 of ADI21 and Table A.4.3.2.1 of ADI22)

6.2 Administrative Authorities

6.2.1 Mandatory Administrative Authority Roles

DSAs shall be able to carry out the following specific roles of Administrative Authorities for Distributed Operations (here the term "Current DSA" is used to indicate the DSA under consideration).

How the administrative authority performs these roles is outside the scope of this part of ISO/IEC ISP 10615.

6.2.1.1 Naming Contexts

DSAs shall be able to create, update and delete Naming Contexts, thereby effecting the transition of authority for portions of the DIT (this calls for the presence of a subordinate reference in another DSA—the superior DSA—that references the current DSA—see Figure 4 below).

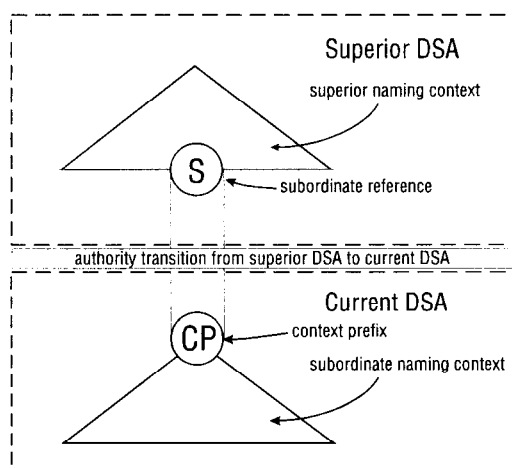


Figure 4—Authority Transition-Subordinate DSA

6.2.1.2 Superior references

Support of superior references is mandatory, although a DSA that is acting as a first-level DSA possesses no superior reference. DSA claiming support of a superior reference shall be able to create, update (i.e. change the name or presentation address, or both, for the referenced DSA). It shall also be capable of deleting the reference if required to become a first-level DSA.

6.2.1.3 Subordinate references

DSAs shall be able to create, update and delete Subordinate References, thereby effecting the transition of authority for portions of the DIT from the current DSA to another DSA (see Figure 5 below)

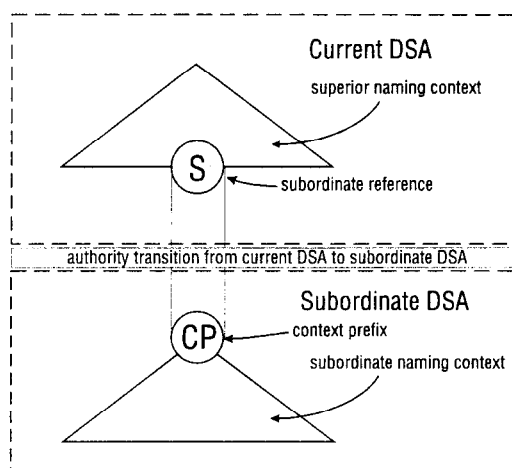


Figure 5—Authority Transition-Superior DSA

6.2.1.4 Correcting Knowledge Information

DSAs shall be able to rectify errors in knowledge information (e.g. Presentation Address and AETitle) by appropriate local means (for example, errors detected as a result of inconsistencies in Knowledge or of Naming Context information), and in particular shall be able to correct access-point information for any knowledge reference supported while maintaining consistency, or permitting the maintenance of consistency, between references to particular DSAs.

6.2.2 Optional Administrative Authority Roles

6.2.2.1 Cross references

Support of cross references is optional; however, a DSA claiming support of cross references shall be capable of the creation, updating (i.e. changing the name, presentation address, or both, for the referenced DSA) and deletion of cross-references.

6.2.2.2 Non-specific subordinate references

Support of Non-specific Subordinate References is optional; however, a DSA claiming support of Non-specific Subordinate References shall be capable of the creation, updating (i.e. changing the name, presentation address, or both, for each referenced DSA) and deletion of Non-specific Subordinate References.

6.2.2.3 Naming contexts comprising a single alias

DSAs are not obliged to contain naming contexts which consist of a single alias as the sole entry in the naming context.

NOTE. The use of such naming contexts may be required for certain Directory naming schemes (e.g. having dual naming schemes in which every RDN in the distinguished name of an entry has a corresponding alias).

6.3 Support of Application Contexts

All DSAs conformant to this part of ISO/IEC ISP 10615 shall support the **DirectoryAccessAC** or **DirectorySystemAC** or both.

A DSA which is to permit the dissemination of its knowledge references to one or more DSAs within another DMD (Directory Management Domain) is obliged to support the **DirectorySystemAC**, at least as a responder to chained operations. (see [ISO/IEC 9594-5 | CCITT X.519] Clause 9.2.1a.)

NOTE. If a DSA does not support the **DirectorySystemAC**, it may not be able to carry out simple authentication of a user whose entry is not held by that DSA (see clauses 6.3.2 and D.9 in Annex D of this part of ISO/IEC ISP 10615).

A DSA that can only act as an acceptor is not obliged to be able to generate a DSA-BIND (or DSA-UNBIND).

All DSAs supporting the **DirectorySystemAC** shall, however, be able to invoke an A-ABORT on an incoming DSP association.

6.3.1 Referral Mode

A DSA conforming to this part of ISO/IEC ISP 10615 shall be able to use the referral mode of interaction, even if it only supports the **DirectorySystemAC**.

6.4 Aliases

DSAs conformant with this specification shall be able to carry out Name Resolution and search continuation with respect to Aliases held outside the DSA (as well as those held inside the DSA).

6.5 Authentication for DSA-Bind

6.5.1 Forms Of Authentication

DSAs conforming to this part of ISO/IEC ISP 10615 that support the **DirectorySystemAC** shall be able to carry out the authentication of DSAs using simple unprotected authentication with password, with optional capability of using the following methods:

- Simple protected authentication
- Strong authentication
- External authentication procedure

NOTE. The bulleted options are outside the scope of this part of ISO/IEC ISP 10615.

A DSA shall be able to accept any valid DSA-Bind requests of any form, whether or not this form permits authentication, and even whether or not the authentication can be verified.

NOTE. DSAs should perhaps be encouraged not to emit authentication elements when they cannot be used, but there is a significant issue about how they are to determine when authentication (of a particular form) is appropriate and when it is not. DSAs probably ought to maintain a table from which they may find or deduce which DSAs should be recipients of authentication elements.

7 Procedures

7.1 Name Resolution

7.1.1 General Requirements

[ISO/IEC 9594-4 | CCITT X.518] defines a two-stage Name Resolution process, in which the Name Resolution is done first in terms of Naming Contexts ("Find Naming Context"), and subsequently in terms of entries (and possibly Subordinate or Non-specific Subordinate References) associated with a particular Naming Context ("Local Name Resolution").

This part of ISO/IEC ISP 10615 makes no specification as to the form of the Name Resolution procedure, provided that it is externally compatible with the standards. See Clause 7.3.3 which gives rules for the use of error reporting during Name Resolution.

7.1.2 Use Of Subordinate References

If the use of a Subordinate Reference results in an "invalid-reference" Service-Error, a DSA receiving such an error shall be able to return instead a "DIT-error" Service-Error (e.g. if security policy permits).

7.2 Request Decomposition

If a DSA is carrying out a list or search procedure involving multiple DSAs (i.e. it is carrying out a chaining operation in the course of a List or Search operation using the List (I) and List (II) procedures of X.518 clause 18.7.2.1 or the Search (I) or Search (II) procedures of X.518, clause 18.7.2.2), the DSA may receive an error indication from another DSA when it would normally expect to receive list or search entry data.

If such an error indication is received, it should not cause failure of the list or search operation, since to do so would prevent valid results being returned.

When it is possible that a DSA contains entry information that would normally be returned by following the continuation reference, but this fact is obscured by an error indication received from the DSA, PartialOutcomeQualifier shall be present and shall contain an unexplored element (defined as a **SET OF ContinuationReference**). There shall be a **ContinuationReference** element corresponding to the point of the tree at which continuation would have occurred, but this specific **ContinuationReference** element (which contains a **SET OF AccessPoint**) may optionally contain no access-point in respect of the particular DSA that reported the error. (Note that this could result in an empty SET OF access-points in the continuation reference.) This option avoids passing back a situation in which the DUA would only hit the same error if it attempted to follow the continuation reference.

7.3 Integrity of Operation Arguments

For any operation argument in the abstract service (ReadArgument, etc.) that can (in principle) be signed, the content of any such argument shall always be passed on unchanged (subject only to variations in ASN.1 encoding which do not affect primitive values).

In particular, elements having default values that are absent in the incoming ASN.1 shall remain absent, and defaulted elements that are present in the incoming ASN.1 shall remain present.

7.4 Use of Associations

7.4.1 Optional Establishment Of Ad-Hoc Associations

If as a consequence of Name Resolution, a DSA identifies a second DSA to which chaining is to take place (i.e. excluding the case of referrals), it has the following options:

Chain an operation to the DSA if an Association has already been established with it

Establish an Association with it which may be used to chain the operation

If neither of these are possible, the DSA shall indicate (if necessary) that an association cannot be established with the second DSA; this shall be treated as if the DSA to which the Association takes place had itself responded with a service problem "unavailable". Alternatively, the DSA may have a policy to return a referral, which optionally may contain an empty set of access points as recommended in 7.2 for the case of request decomposition.